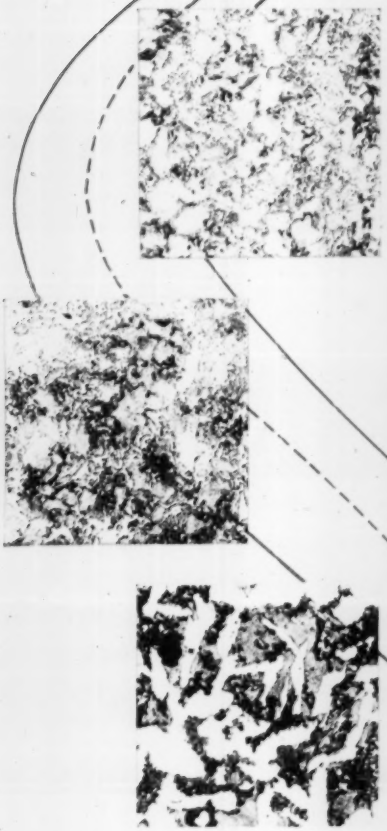
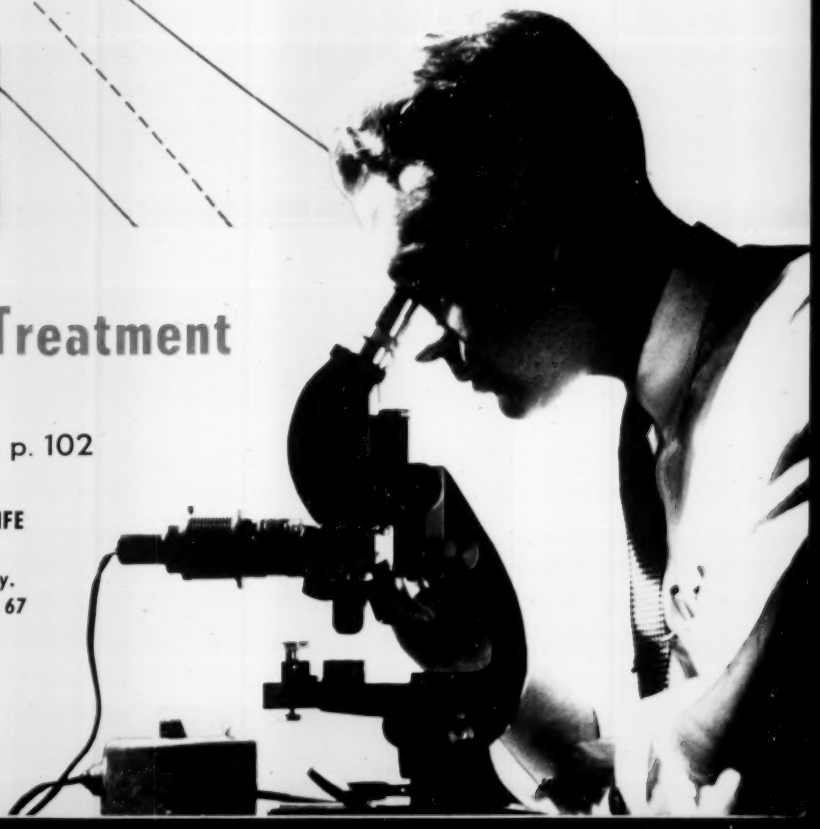
MARCH 29, 1954

STEEL

THE WEEKLY MAGAZINE OF METALWORKING





Modern Heat Treatment

Turn on the heat
to turn down your costs . . . p. 102

✓ **NEW LEASE ON BUSINESS LIFE**
Not everyone should rent
But don't ignore the possibility.
First of a series on leasing, p. 67

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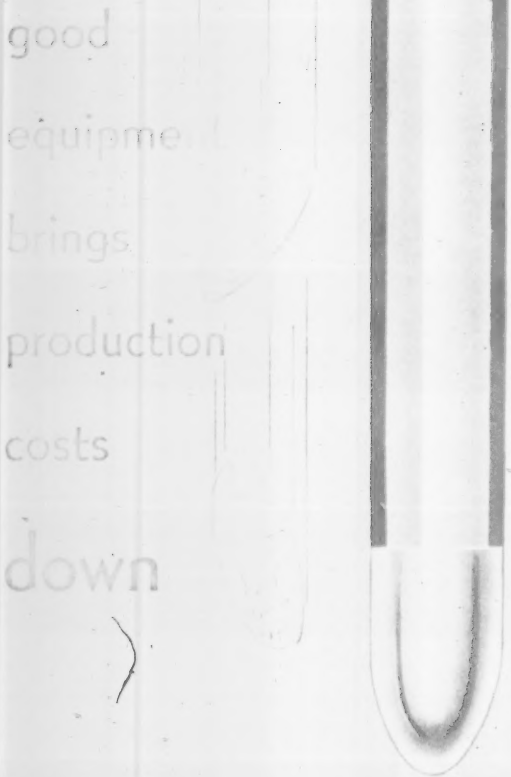
SEAMLESS TUBE MILLS



Every improvement in seamless tube mill equipment has been developed by the combined efforts of the steel industry and Aetna-Standard. That's one reason why Aetna-Standard builds more seamless tube mills than all companies combined. If you contemplate adding tube facilities or revamping existing equipment, call in Aetna-Standard. Such data as costs, rates of production, amortization, equipment details, will give you good information on which to base a decision. **Only from Aetna-Standard can you obtain this authoritative guidance.**

THE AETNA-STANDARD ENGINEERING COMPANY • PITTSBURGH, PA.

Aetna-Standard

PLANTS IN WARREN, OHIO • ELLWOOD CITY, PENNSYLVANIA

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Standard Engineering Company, Ellwood City, Pa.
Trans-World Traders, Pittsburgh, Pa.

Designers and Builders to the Ferrous, Non-Ferrous, Leather, Rubber, and Plastic Industries

What Does Grain Size Mean In An Alloy Steel?

This is the third of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

The grain size of alloy steels is understood to mean austenitic or inherent grain size. Austenitic grain size should be distinguished from ferritic grain size, which is the size of the grains in the as-rolled or as-forged condition with the exception of those steels that are austenitic at room temperature. When steel is heated through the critical range (approximately 1350 to 1600 deg F for most steels, depending on the composition), transformation to austenite takes place. The austenite grains are extremely small when first formed, but grow in size as the temperature above the critical range is increased, and, to a limited extent, as the time is increased. It is apparent, therefore, that both time and temperature must be constant in order to obtain reproducible results.

When temperatures are raised materially above the critical range, different steels show wide variations in grain size, depending on the chemical composition and the deoxidation practice used in making the heat. Heats are customarily deoxidized with aluminum, ferrosilicon, or a combination of deoxidizing elements. Steels using aluminum or certain other deoxidizers in carefully-controlled amounts maintain a slow rate of grain growth at 1700 deg F, while heats finished with still other deoxidizers, usually ferrosilicon, develop relatively large austenitic grain size at temperatures somewhat below 1700 deg F.

The McQuaid-Ehn test is the one ordinarily used for determining grain size. Steel is rated with a set of eight ASTM charts that are compared one at a time with a specially-prepared steel sample until one is found to match. Number 1 grain size, the coarsest, shows 1½ grains per sq in. of steel area examined at 100 diameters magnification. The finest chart is Number 8, which shows 96 or more grains per sq in. at the same magnification.

PROPERTIES AFFECTED BY GRAIN SIZE

Fine-grain steels (grain sizes 5, 6, 7, and 8) do not harden as deeply as coarse-grain steels, and they have less tendency to crack during heat-treatment. Fine-grain steels exhibit greater toughness and shock-resistance—properties that make them suitable for applications involving moving loads and high impact. Practically all alloy steels are produced with fine-grain structures.

Coarse-grain steels exhibit definite machining superiority. For this reason a few parts which are intricately machined are made to coarse-grain practice.

The correct specification and determination of grain structure in steel is a subject that has been given long study by Bethlehem metallurgists. If you would like suggestions on this or any other problem concerning alloy steels, these men will be glad to give you all possible help.

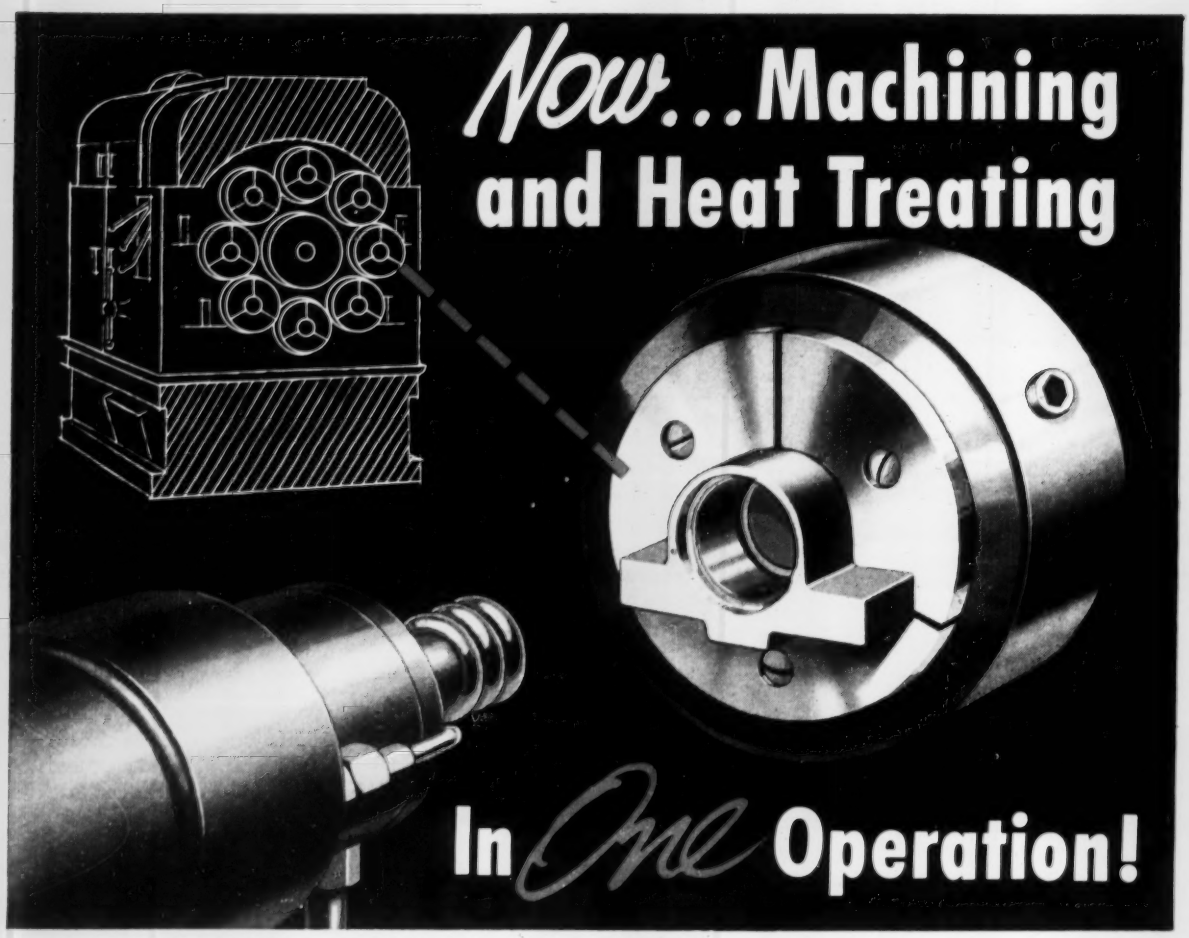
In addition to manufacturing the entire range of AISI alloy steels, Bethlehem produces special-analysis steels and the full range of carbon grades.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM ALLOY STEELS

BETHLEHEM STEEL



with TOCCO Induction Heating

Mechanics Universal Joint Division of Borg-Warner Corporation now combines automatic heat-treating and metal-working operations on the same machine!*

A Tocco Inductor Coil, matched to one spindle of a multiple spindle automatic screw machine, heat treats the inside diameter of automotive trunnion cups—after they have been completely formed on the same machine tool. Twenty-two, 20 and 50 kw, 450,000 cycle TOCCOtron Induction Heating units and 44 automatic screw machines (installed here and in other plants) make up this high-speed production team.

This new method permits the use of SAE 1144 steel and eliminates costly, time-consuming copper plating and carburizing operations formerly required. Heating and quenching cycles total approximately 10 seconds per part, and production is in excess of 300 parts per hour from each machine.

If your products or their components require heat treating, soldering, brazing or forging it will pay you to investigate TOCCO for better, faster ways of producing them at lower unit cost.

*This process developed and patented by TOCCO.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg. U. S. Pat. Off.

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. S-3, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating."

Name_____

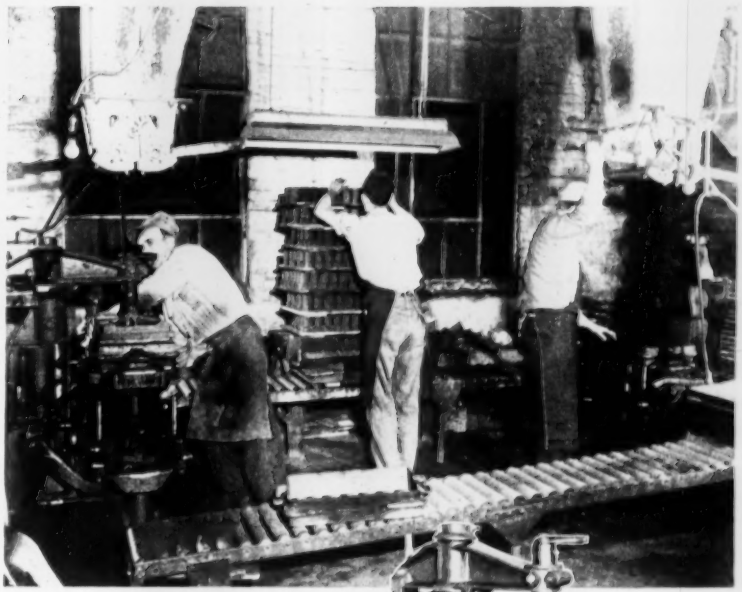
Position_____

Company_____

Address_____

City_____ Zone____ State_____

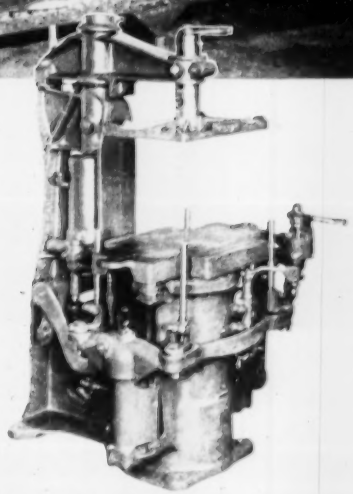
CHANGE TO OSBORN MACHINES NETS 20% MORE MOLDS A DAY ...to cut foundry molding costs



More efficient, lower cost production of complex molds is being realized daily in both the small and large foundry by replacing existing equipment with Osborn Vibrating Jolt Squeeze Strippers. That's because with Osborn's effective vibrating jolt, harder molds with more accurate contours on intricate patterns can be produced in less time than with conventional machines.

Here is how a three-man team, using Osborn Vibrating Jolt Squeeze Strippers, now produces 20% more molds a day per man in the production of fittings and ornamental castings at the Indiana Brass Company, Frankfort, Indiana.

The Osborn operator at the right makes the drags. The man in the center sets the cores. The Osborn operator at the left makes copes and closes the molds. Net output per man per day is 250 molds . . . compared to 200 molds a day formerly turned out by an experienced molder.



GET OSBORN'S COST CUTTING FACTS

The Osborn Vibrating Jolt Squeeze Stripper is particularly suited for molding small valves, ornamental brass, soil pipe fittings and other castings where molds are reasonably shallow and separate cope and drag patterns are used.

Regardless of the type of castings you now produce, your Osborn representative can show how to simplify molding operations with improved Osborn machines. Write The Osborn Manufacturing Company, Dept. EE-16, 5401 Hamilton Avenue, Cleveland 14, Ohio.

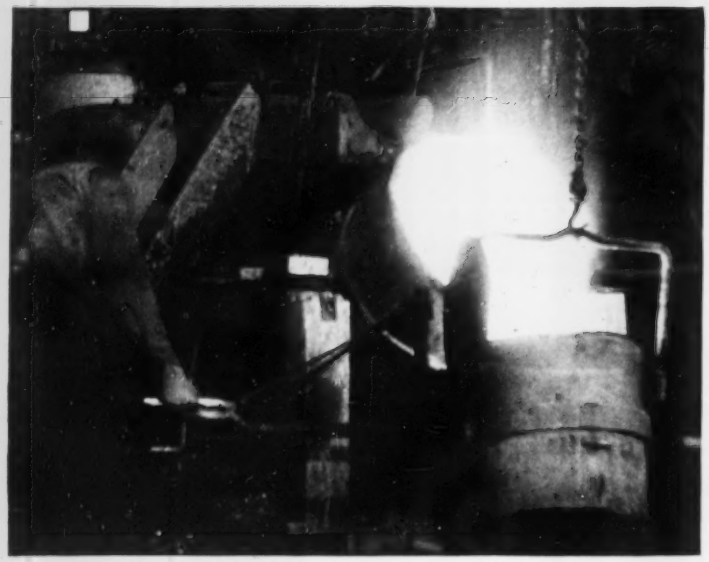
OSBORN

MOLDING MACHINES CORE BLOWERS

Another example of Osborn leadership and advanced engineering

Visit us at the Foundry Show Booth No. 1115

about Radiant foundry coke



Speeds melting!

HIGH CARBON PICKUP

You get *hotter and faster* melting and *high carbon pickup* in the cupola with TENNESSEE Radiant Foundry Coke. Check these properties:

High Carbon (above 90%)
Low ash (below 8%)
Low sulphur (below 0.60%)
Low volatile matter (below 1%)
Low porosity (below 49)

HIGH SHATTER TEST

And you make less breeze with this foundry grade coke because of its *large size* and *toughness*. Has "shatter test" above 95% on 2" screen.

TENNESSEE'S rigid controls assure *high uniformity* in both chemical and physical analyses of this high quality coke. Made in by-product ovens at Chattanooga, Tenn.

MAIL COUPON TODAY!

TENNESSEE PRODUCTS & CHEMICAL CORPORATION
Department S-3, Nashville 3, Tennessee

Send complete information on Radiant Foundry Coke.

Name
Position
Company
Address
City State

TENNESSEE PRODUCTS & CHEMICAL Corporation
NASHVILLE, TENNESSEE.

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This Week in Metalworking

STEEL
THE WEEKLY MAGAZINE OF METALWORKING

Vol. 134 No. 13 March 29, 1954

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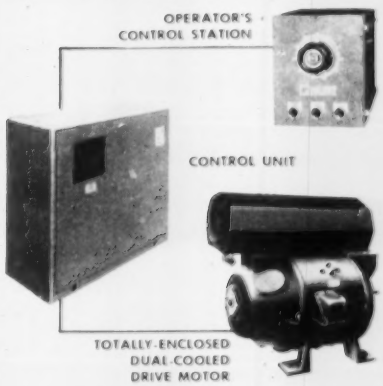
CONTINUOUS OPERATION at any speed

RELIANCE V★S DRIVE with the new

Totally-Enclosed Dual-Cooled motor



For operation over extremely wide speed ranges . . . or wherever high ambient temperatures, intermittent operation, prolonged low-speed operation, or severe duty cycles pose difficult cooling problems . . . the new Reliance Totally-Enclosed Dual-Cooled Motor extends the application range of the V★S Drive. The new Dual-Cooled Motor is also available in explosion-proof construction, conforming to Bureau of Mines and Underwriters' specifications, in Ratings from 15 through 150 hp.

GET THESE FACTS NOW!

Your request for Bulletin C-2201 will bring you this new booklet showing operation of Reliance Dual-Cooled Motor, together with fact-filled bulletin showing production increases and operating economies with Reliance V★S Drive.

RELIANCE
ELECTRIC AND ENGINEERING CO.
1081 Ivanhoe Road • Cleveland 10, Ohio

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STOP RUST

once and for all

with HOT-DIP GALVANIZING

Send your iron and steel products to a member of the American Hot-Dip Galvanizers Association. His years of experience plus collective know-how assure you of a top quality job—if it's iron or steel have it Hot-Dip Galvanized.

Send for Free Booklet

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Print

Name

Firm

Address

City State

behind the scenes

Can Opener Come-uppance

Are you ready for Can Opener Week? May 3 thru 8 has been so designated, and a nationally organized inter-industry drive is under way to promote the sale of higher-priced and better-profit can openers.

Can openers, it seems, are trying to better themselves. They are tired of their "5 and 10 cent" level in the economic order and want to go high brow. Fact is, they want to get out of the wild and messy jumble of the kitchen table drawer and get up on the wall where the air is fresher and where the baby can openers can be brought up in a more orderly, more pleasant environment.

Plans call for 3000 salesmen, representing 600 hardware wholesalers and can-opener manufacturers contacting 50,000 department, hardware, variety and grocery stores during the nationwide drive.

Good luck to the lowly can opener in its campaign for well-deserved recognition. Just imagine the predicament you would be in, sir, were it not for that unsung hero of the modern kitchen.

Greatest invention since the service station rest room . . . and it's one the Russians can't claim.

Wanted: Second-hand Corn Cobs

As of right now this typewriter and two badly battered index fingers are for sale. We're going into the supermarket business with a clientele made up exclusively of steel companies.

This sudden and completely impulsive decision is prompted by the fact that we've just learned that tremendous quantities of sugar, salt, molasses, suet, soap, palm oil and cereal are all necessary ingredients in the making of steel.

Sugar, we understand, is used in the open-hearth department where it is sprinkled inside ingot molds to form a slippery surface to prevent the steel from sticking. Molasses is mixed with sand in the making of mold cores. Salt serves to break the scale from the surface of steel slabs when they are being rolled into plates; also serves as a fluxing agent in open-hearth ladles. Both tallow and suet are used to polish stainless steel, while either of them rubbed on carbon steel prevents rust formation.

Soap, used as a lubricant, reduces friction in the drawing process of making rods into wire. Palm oil, in paste form, is also used for this purpose. Liquid palm oil and lard oil are used as lubricants in rolling steel sheets and strip by the cold reduction process. The oldest use of palm oil, we are told, is in the manufacture of tin plate by the hot-dip method.

And get this. Cereaf, that stuff that Super Circus and Roy Rogers made famous, is also used in the final stages of this same hot-dip process for making tin plate.

But that isn't all. Corn cobs, peanut shells, and toothpicks all play critical roles in the daily operation of the steel mill. Corn cobs and peanut hulls when ground into meal are used in the sheet mill to polish terne plate. Toothpicks are used to pry residuary fragments of metals from wire extrusion dies.

Perhaps you would like to join me in this venture? Wouldn't it be a swell way to get rid of our old peanut shells and second hand corn cobs?

Build Better Bosses

Say, did you read "Build Better Bosses" in last week's issue of STEEL? That was a humdinger of an article. Had Ambrose, the ambidextrous office boy, virtually drowning in his saliva. Made him feel that even he has a chance.

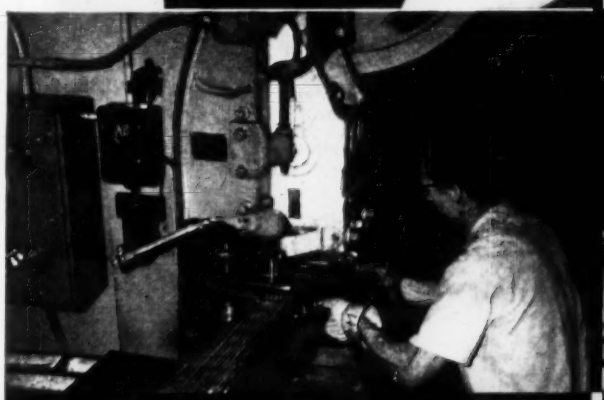
If you are one of the bright-future boys, you'll want to search out your copy of STEEL and read it.

If you are already the Boss and want to bring those promising young men along so as to fill important executive spots in your company two, five or ten years from now, best you read it too. You'll be glad you did.

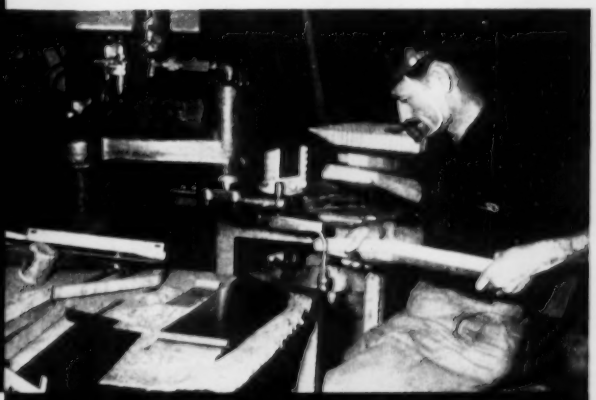
Shrdlu

(Metalworking Outlook Page 49)

Baseboard Heater Manufacturer Safeguards Product By Specifying Rust-Resisting, Paint-Holding Galvanite*



Punching louvers into baseboard face requires consistent steel hardness.

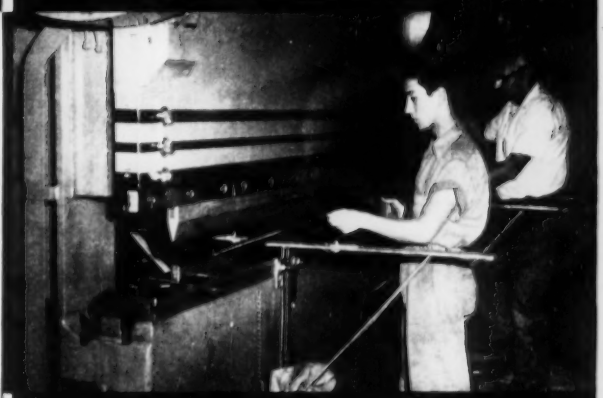


Galvanite* takes welding as easily as plain steel. Here baseboard ends are being spot welded.

Any baseboard, whether it be simple trim moulding or a modern heating unit, is subject to a lot of wear and punishment. That's why a leading eastern manufacturer of baseboard heating systems specifies Galvanite* throughout. As they put it: "There is no substitute for quality, and we have found Galvanite* best for our purposes."

Galvanite* is Sharon's special process zinc-coated steel. It forms as well as hot rolled steel without flaking or peeling or excessively coating the dies. And, as this baseboard manufacturer discovered, Galvanite* has a surface that really grips paint.

If you are manufacturing a product that must withstand rust and corrosion, or a product that is subjected to the weather, you won't find a better steel anywhere than Sharon Galvanite*. Try it, compare results, and we feel sure you, too, will specify Galvanite* from here on in.



Forming Galvanite* requires no special preparation. This manufacturer uses both roll forming machines and press brakes.

*Trade name copyrighted by the Sharon Steel Corporation

Type 430 Stainless and Galvanite* Coated booklets are available from any Sharon office.

SHARONSTEEL

DISTRICT SALES OFFICES

Chicago	Cincinnati
Cleveland	Boston
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Milwaukee	New York
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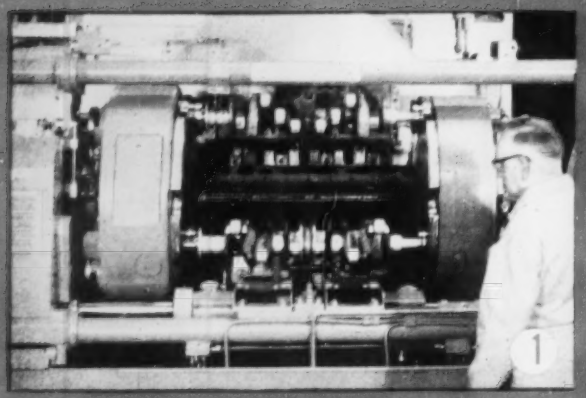
Los Angeles	San Francisco
Seattle	
Montreal, Que.	Toronto, Ont.

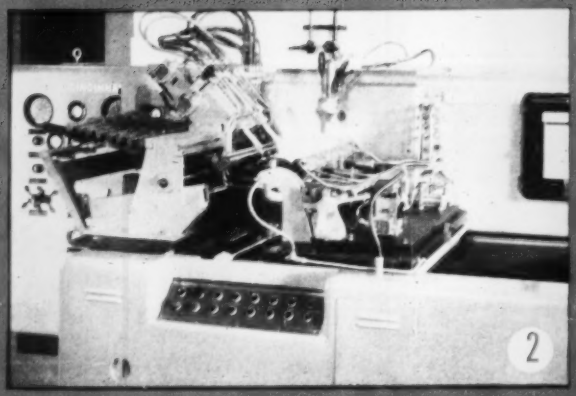
SHARON STEEL CORPORATION

Sharon, Pennsylvania

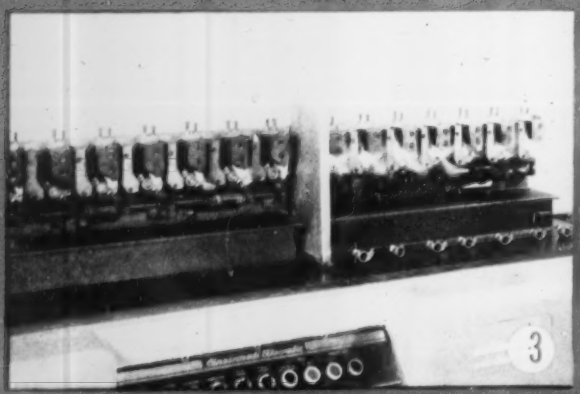
Wherever Rust is a Problem-Specify Galvanite*



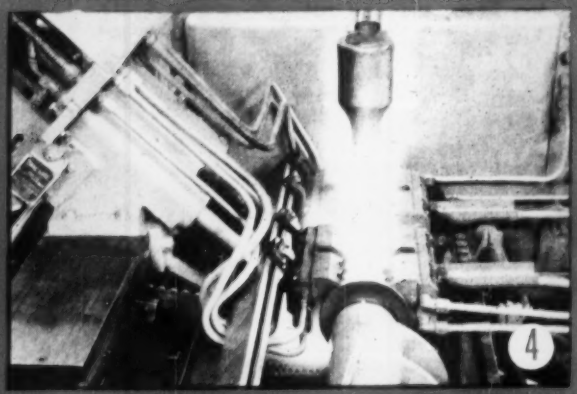
Flamatic selectively hardens all throw and main bearings of crankshafts.



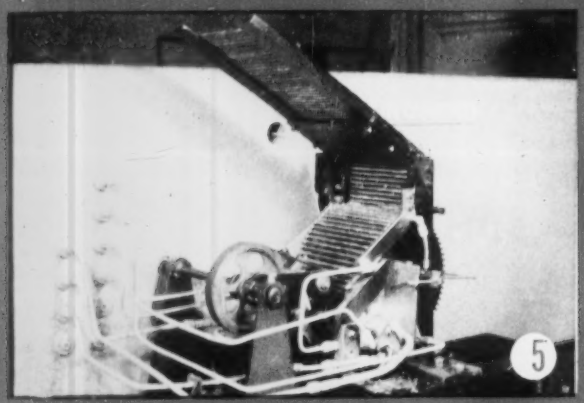
Selective hardening camshafts. Operation fully automatic except for loading.



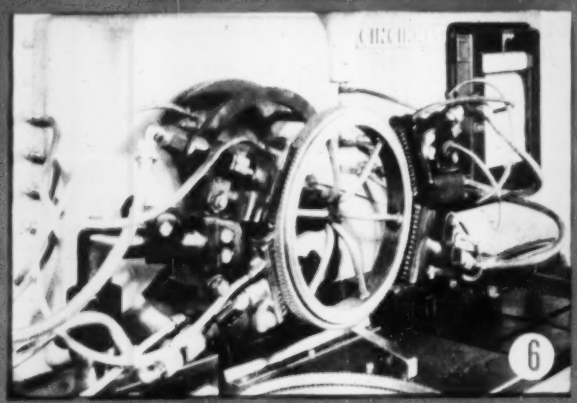
Two-station Flamatic selectively hardens cups and pads on seven rocker arms simultaneously while operator loads other station.



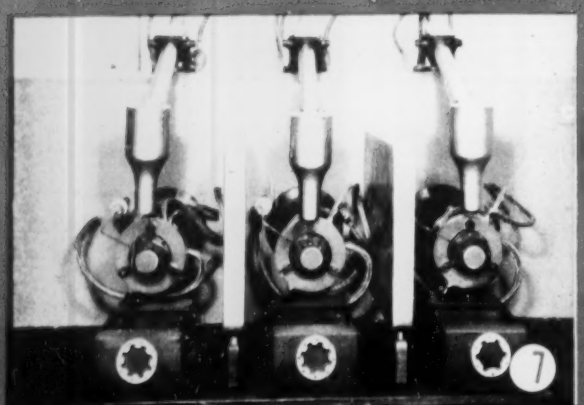
Selective hardening eight bearing surfaces on rocker arm shaft.



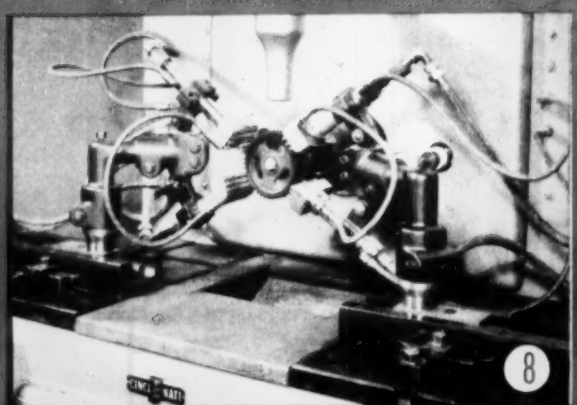
Ribbon type flame heads permit continuous selective hardening of push rods.



Two-at-a-time Flamatic hardening of ring gears provides 300/hr. production.



Three machines in one: Permits simultaneous selective hardening three sizes of overriding clutch cams for automatic transmissions.

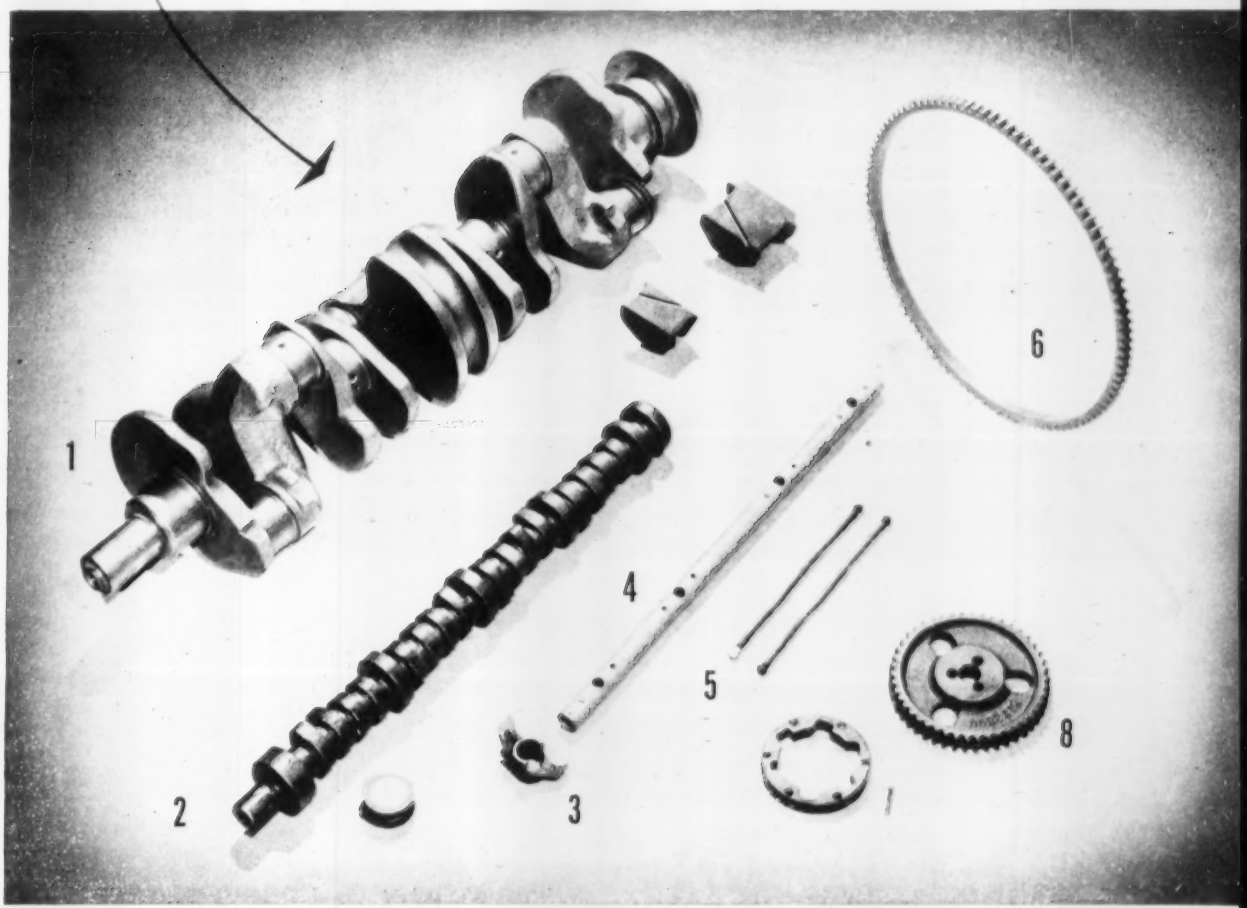


Four flame heads harden two timing gears simultaneously.

what we hardened and how we did it

1. Crankshaft
2. Camshaft
3. Rocker arm
4. Rocker arm shaft
5. Push rod
6. Starter ring gear
7. Overriding clutch cam
8. Timing gear

Here's a quick "road show" of Flamatic selective surface hardening applications to automotive parts, demonstrating the wide range of shapes and sizes Flamatic can handle on a high production basis. Operation photos show how flexible tooling makes the basic Flamatic machine extremely productive.

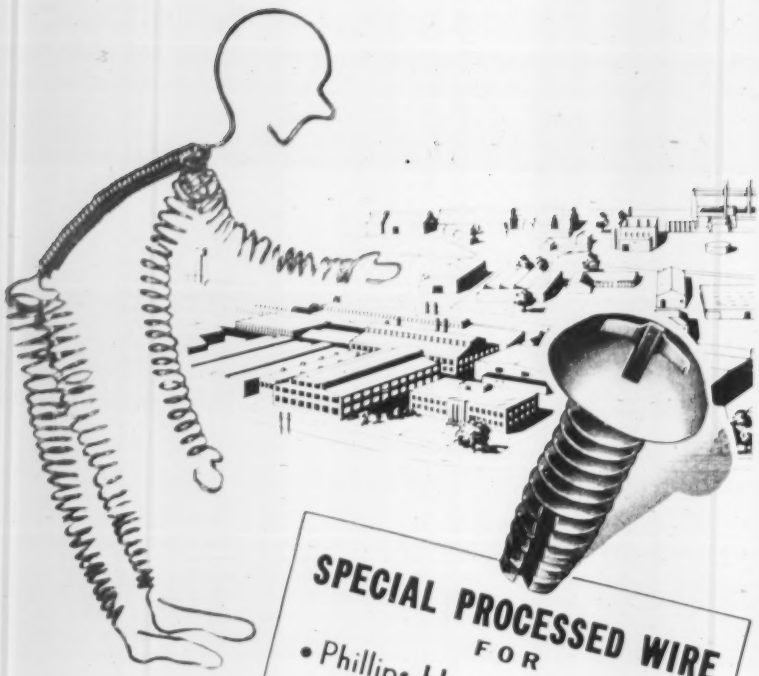


These applications illustrate the three basic Flamatic principles—concentrate heat, control temperature, and confine hardness—which result in exceptional uniformity of results.
While the machines illustrated involve special modifications or tooling for long runs at high production, standard Flamatics permit economical handling of short runs when parts can be handled with relatively simple tooling or work-holding fixtures.
The Cincinnati Flamatic Heat Engineering Laboratory is at your service to analyze your needs, test-run your parts, and make recommendations. Write for Publication No. M-1724.

visit booth no. 1202, ASTE show, April 26-30

flamatic

THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio, U.S.A. • CINCINNATI



PRODUCTION CAPACITY DOUBLED

To keep pace with the rapid increase in the use of recessed head screws, Keystone is doubling its capacity in the manufacture of "Special Processed" wire.

The unusual qualities of Special Processed Wire are recognized by licensed manufacturers of recessed head screws. This wire has also proved itself superior on many other difficult cold heading jobs.

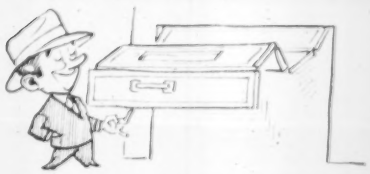
Our additional capacity will enable us to meet the ever-increasing demand for "Special Processed" wire by our present customers and at the same time welcome new customers.

INDUSTRIAL WIRE SPECIALISTS

Keystone Steel & Wire Company
PEORIA 7, ILLINOIS

LETTERS
TO THE EDITORS

Door to Opportunity



While reviewing your article "New Avenue to Industrial Development" (Mar. 8, p. 78), we were attracted by the power-driven overhead garage door that is retailed for less than $100. Later in the same article you say, "a low-cost, fool-proof, power-driven overhead door, controlled by a photomultiplier tube that recognizes light impulses only and won't react to stray light or radio waves." Any information you can send along regarding this particular product and a booklet of general information on Rand Development Corp. will be most appreciated.

James E. Drylie
assistant sales manager
SUP-R-GUY Products Division
Gilbert Steel Co.
Pittsburgh

• *This letter has been forwarded to the Rand Development Corp.—ED.*

Little Boron Goes Long Way

I was interested to see the results provided by Kaiser Steel Corp. in the article "A Pinch of Boron Doubles Yield Point of Low-Carbon Steel" (Feb. 22, p. 107). I can well understand that this information will be of particular interest to your readers.

I note on p. 107, middle column, that you refer to temperatures of 450 to 500 F. That should, of course, read 450 to 500 C.

W. E. Bardgett
research manager
United Steel Companies Ltd.
Research & Development Department
Rotherham, England

We were very interested in your article "A Pinch of Boron Doubles Yield Point of Low-Carbon Steel." In it you made two statements about the availability of molybdenum: "Adoption of the steel for civil applications is dependent largely on the availability of moly," and "Developments in these and other applications are expected to receive attention when the moly situation improves."

Both statements are out of date. Molybdenum has been in abundant supply for eight months.

The recently completed expansion program increased the capacity of the Climax mine nearly 80 per cent and made it the largest underground mine in North America. As a result, the government lifted all domestic controls on June 30, 1953, and abolished export quotas in January, 1954.

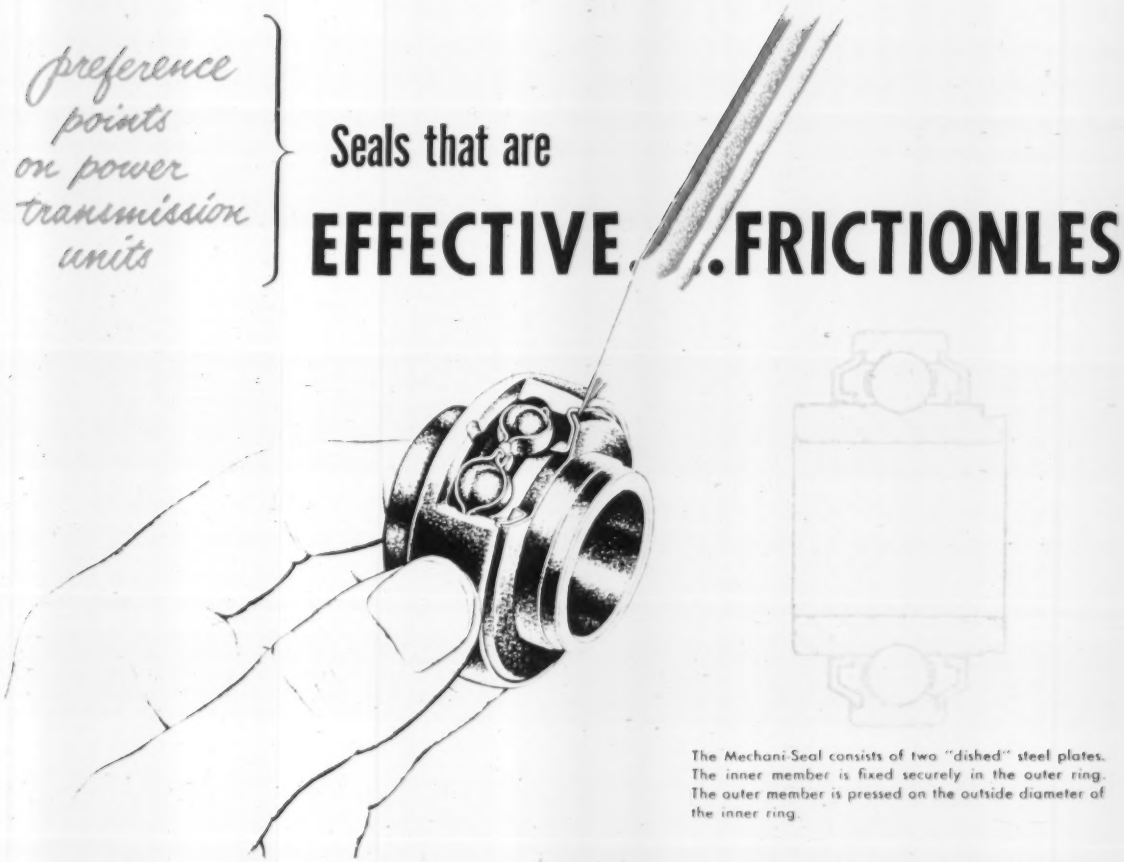
We would be grateful if you would inform your readers—many of whom were most patient during the period

Please turn to p. 12

preference points on power transmission units

Seals that are

EFFECTIVE...FRICTIONLESS



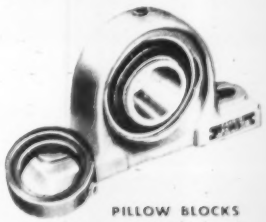
The Mechani-Seal consists of two "dished" steel plates. The inner member is fixed securely in the outer ring. The outer member is pressed on the outside diameter of the inner ring.

For applications where the bearing must be thoroughly protected against the entrance of foreign matter, or where grease must be absolutely retained within the bearing, the Fafnir Mechani-Seal Bearing offers definite advantages. This is the bearing you'll find in most Fafnir Ball Bearing Power Transmission Units.

The labyrinth design of the Fafnir-originated Mechani-Seal provides an inner trap seal for grease retention and an external rotating slinger for dirt exclusion. Close, but definite clearances between various seal members permit the bearing to "breathe". What's more, they insure it against drag, either in starting or running . . . no rubbing to introduce friction . . . no wear. Seals are integral with the bearing, are not subject to fouling or misalignment, and are corrosion and rust resistant.

When you compare design features, point for point, you can readily understand why the preference is for Fafnir Ball Bearing Power Transmission Units. For more details and a complete description of Fafnir Power Transmission Units call your Fafnir Representative. The Fafnir Bearing Company, New Britain, Conn.

WIDE INNER RING BALL BEARINGS
. . . with Mechani-Seals

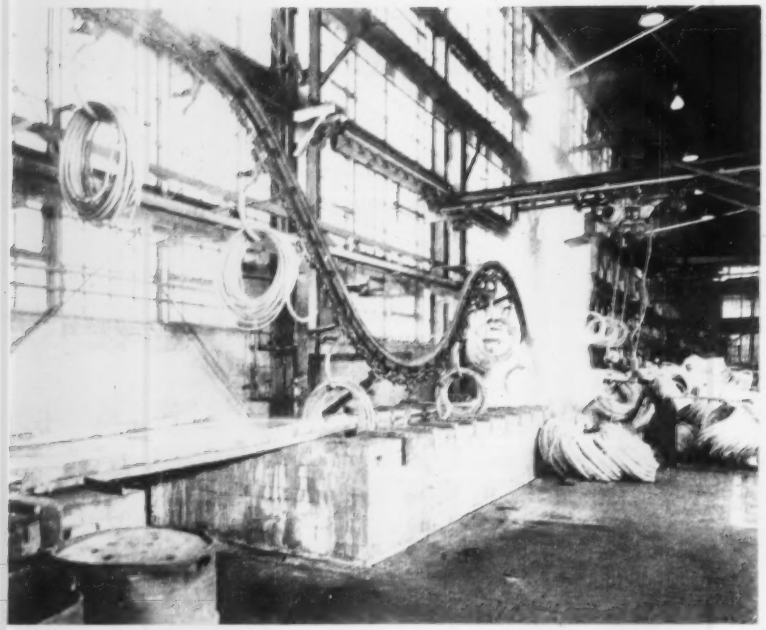


PILLOW BLOCKS
. . . standard and heavy series

FLANGE CARTRIDGES
standard and heavy series

CYLINDRICAL CARTRIDGES
. . . standard and heavy series

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA



OVERHEAD TROLLEY CONVEYERS

one of the many types of high-quality power and gravity conveyers in the MATHEWS Line

Overhead Trolleys are among the most frequently applied types of power conveyers. They are used to serve processing machines, move material from one area to another, take components through painting, drying and enameling operations, and are, in fact, an extremely versatile type of equipment. Trolley Conveyers can be lowered, through the use of transverse bends, to working areas so that parts may be placed or removed from hooks or trays. They are used for storage conveyers, holding materials until needed and saving valuable floor space for production machines.

• Write for catalog HB53 for complete details of Trolley Conveyers and for other types of Power Conveyers and Special Conveying Machinery, or for Catalog No. 853, featuring numerous installations that might help you with your conveying problems. Both catalogs are yours for the asking.

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Engineering Offices or Sales Agencies in Principal American and Canadian Cities

LETTERS

Concluded from p. 10

of controls—that the supply of molybdenum is now great enough to supply all their needs in the foreseeable future. In fact, the industry's capacity is now more than twice the free world annual consumption in the years between World War II and Korea.

R. S. Archer
chief metallurgical engineer
Climax Molybdenum Co.
New York

Coatings for Cold Forming

Would you please send us a copy of the article "Coatings in Cold Forming; Dual Role Makes Lubricant Doubly Important" (Mar. 8, p. 116) by Dr. Samuel Spring, Pennsylvania Salt Mfg. Co.

G. B. Troup
metallurgist
Talon Inc.
Meadville, Pa.

I would appreciate receiving tear sheets of your article "Coatings in Cold Forming."

L. A. Usher
chief engineer
Canadian Steel Improvement Ltd.
Etobicoke, Ont.

Our engineers would like tear sheets of "Coatings in Cold Forming."

L. C. Sinks
International Harvester Co.
Chicago

• *Sent—ED.*

Credit Where It's Due

Your article "Salt Baths . . . Versatile Performers on the Heat Treating Team" (Feb. 15, p. 108) written by this writer inadvertently failed to give proper credit for some of the data used.

Referring to Fig. 2 on p. 111, the idea for this effective method of comparing quenching power and most of the data were the work of R. F. Harvey, chief metallurgist, Brown & Sharpe Mfg. Co., Providence, R. I.

L. B. Rosman
vice president
Ajax Electric Co. Inc.
Philadelphia

• *Credit is given to Mr. Harvey in reprints of this article—ED.*

Selling Hits the Spot

Your timely and excellent article "Now You Have To Sell" (Feb. 22, p. 91), No. 1 in STEEL's Program for Management series for 1954 sure hits the spot.

We would appreciate having 12 tear sheets of this fine article.

STEEL is well read here and we find its many articles of great interest.

Rene P. Magnan
Hartford Laboratory manager
Magnaflux Corp.
East Hartford, Conn.

DOUBLE WELDED

for GREATER SAFETY
Shatterproof, Extra Strong Body Makes It Practically Unbreakable

for GREATER PRODUCTIVITY
High Speed Steel Welded Edge Gives More, Straighter Cuts Per Blade

Starrett SAFE-FLEX
HIGH SPEED WELDED EDGE
POWER HACKSAW BLADES

Double welding makes this great new power blade the safest, straightest-cutting, longest-lasting hacksaw you can buy. Use it with complete safety for your toughest cutting jobs — for multiple sawing or interrupted cuts. Step up the feed and speed and watch it breeze through work that shatters ordinary blades.

Double welded construction as featured in these new Starrett SAFE-FLEX Power Blades gives you a cutting edge of hard high speed steel, reinforced with a medium-hard, extra strong center and backed up by a super-tough steel back. This ideal combination is integrally welded by modern methods to make a far stronger blade with a perfect balance of hardness and toughness.

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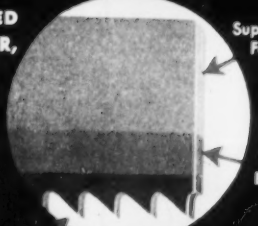
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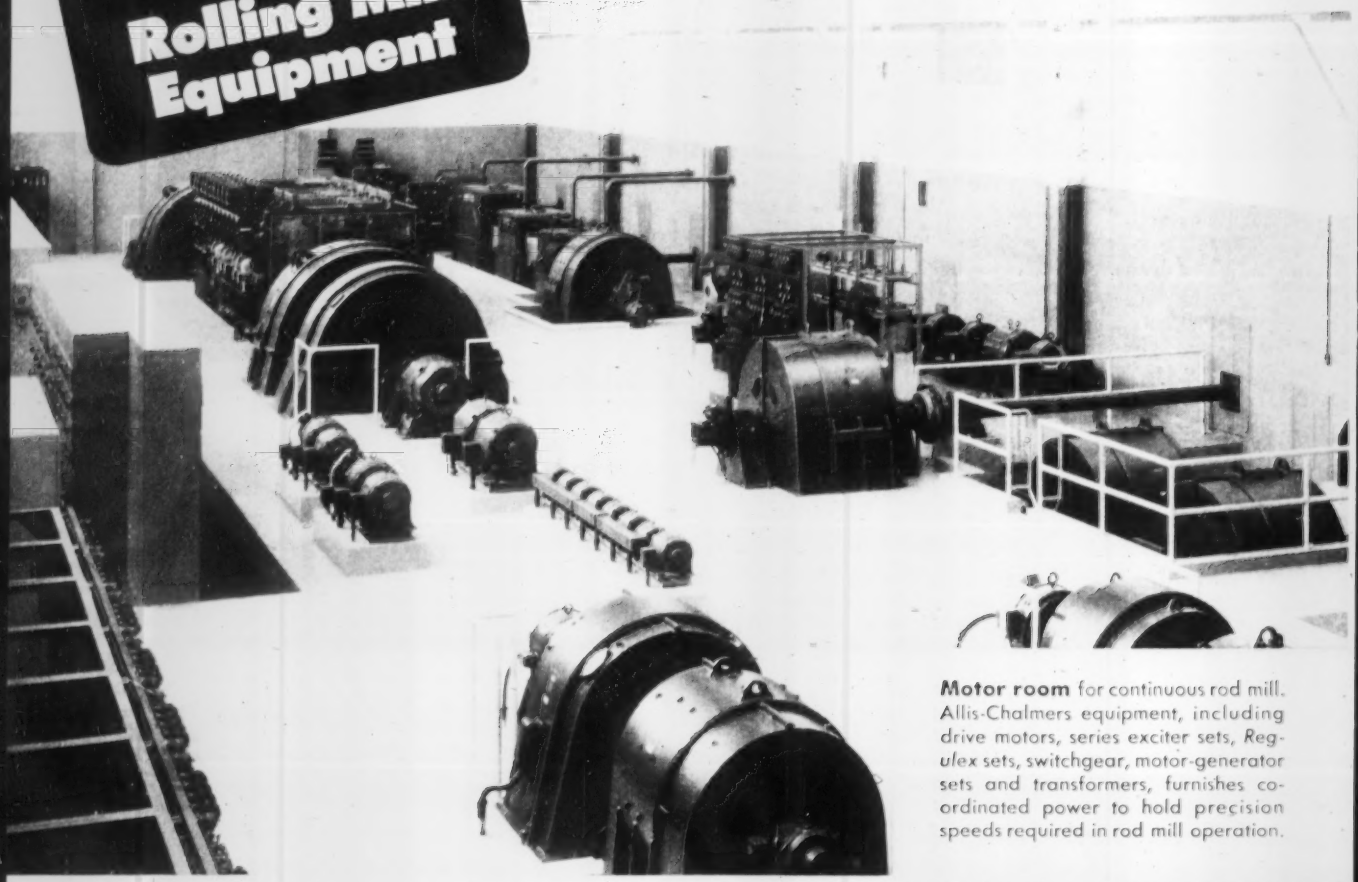
Continental Steel's

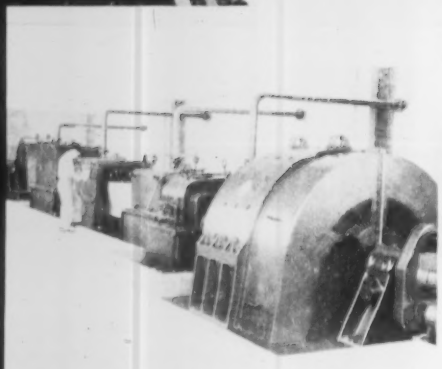
Now in Operation

ALLIS-CHALMERS

Rolling Mill Equipment

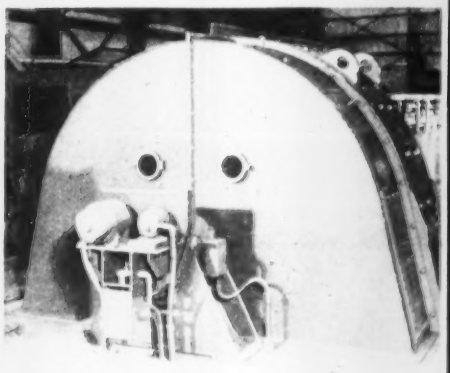


Motor room for continuous rod mill. Allis-Chalmers equipment, including drive motors, series exciter sets, *Regulex* sets, switchgear, motor-generator sets and transformers, furnishes coordinated power to hold precision speeds required in rod mill operation.



Roughing stand drives in the motor room. The 400-hp, 300 900-rpm dc motor in the background drives stands 1 and 2, and the 1500-hp, 300 750-rpm dc motor in the foreground drives roughing stands 3 through 8.

Intermediate stand drives in motor room. Three of the four 800-hp, 300 900-rpm dc motors driving stands 9 through 16. Larger rods are taken directly from these stands without passing through the finishing stands.



Finishing stand drive in the mill proper. This Allis-Chalmers 2000-hp, 300 600-rpm dc motor drives stands 17 through 22. Any number of these six stands may be used to run a variety of small rod sizes.

NEW ROD MILL

at Kokomo, Indiana

AN IMPORTANT PART of Continental Steel Corporation's expansion program to satisfy growing demands for their wire products is the specially designed Allis-Chalmers equipment controlling and driving the 22 stands in this all-new continuous rod mill.

Allis-Chalmers motors and controls are responsible for furnishing the precision speeds required in processing rod from billet to finished product. Each stand must be perfectly coordinated with the others to receive and pass rod from a starting speed equal to a walk and progressing to a finishing speed approximating 60 miles per hour.

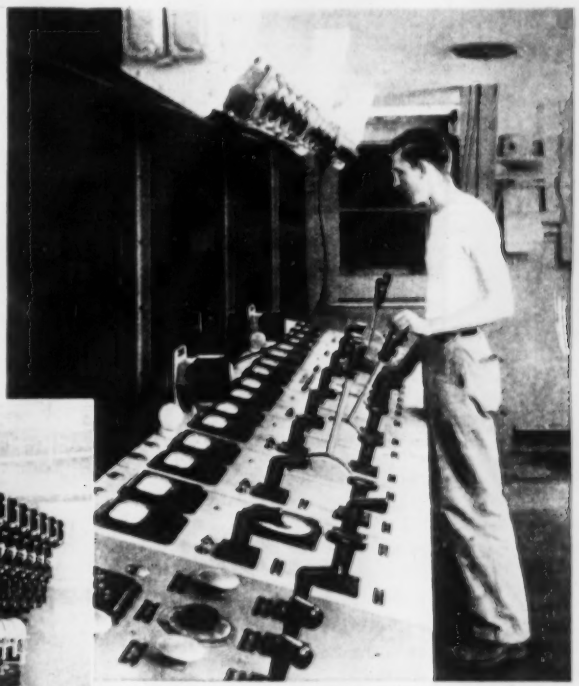
Simplified Control

The seven drive motors are standard rolling mill types, engineered to meet the mill requirements and to operate through a simplified speed control system regulating motor field circuits with individual series exciters. Satisfactory mill operation, running three rods simultaneously, has produced 24 coarse and fine rod sizes from 0.218 to 0.681 inch, with projected use up to 1.125 inches.

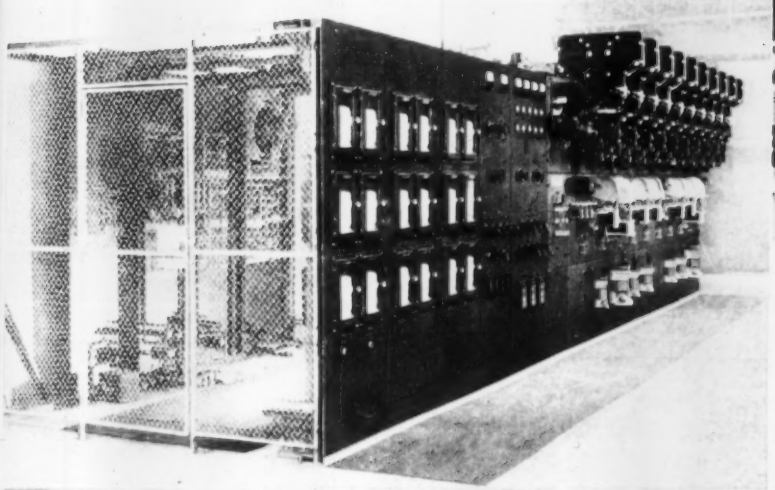
This mill system gives Continental the benefits of flexibility and adaptability, with quality control not limited to a particular product size. Simplified control and durability are features Allis-Chalmers engineers have used to assure low maintenance costs.

For specific information on control, drives, and other electrical equipment to meet the needs of your expansion or conversion program, contact A-C office nearest you or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A 4151

Regulex is an Allis-Chalmers trademark.



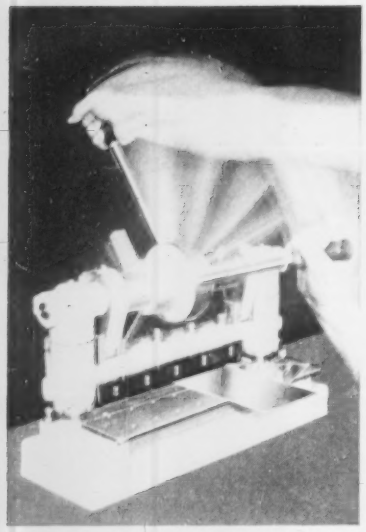
Pulpit control for rod processing. From this vantage point the operator controls stand speeds varying from 38 to 114 feet per minute at the start of roughing, to finishing speeds of 5000 feet per minute.



Variable voltage control panel (left) in the motor room for the main drive motors.

ALLIS-CHALMERS

Power, Electrical, Processing Equipment for Iron and Steel



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- **DELIVERY** immediate on most models.
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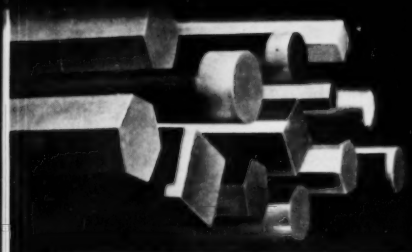

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Titan brass is right for high efficiency, trouble-free maintenance, simplicity, corrosion resistance, lasting beauty, durability against abrasion and wear . . . no matter what the product.

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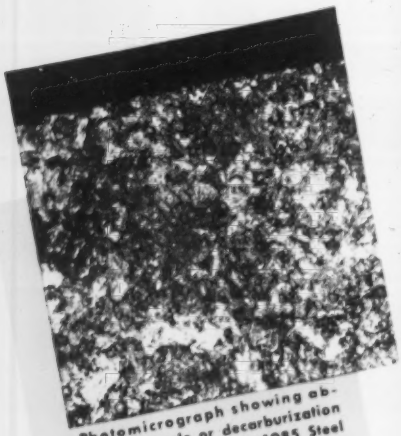
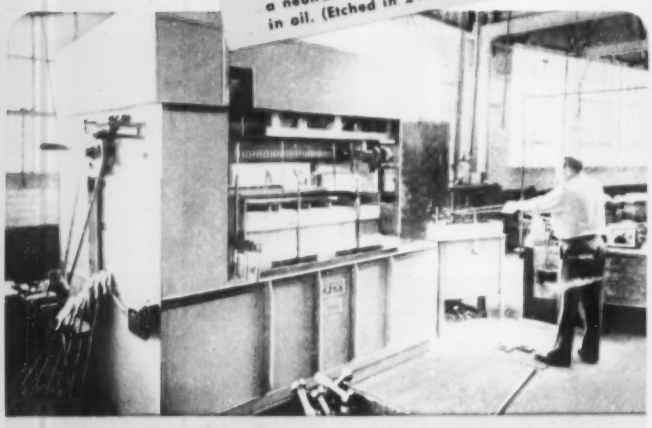


Photomicrograph showing absence of scale or decarburization in a section of S.A.E. 1085 Steel (X100) hardened at 1500° F. in a neutral salt bath and quenched in oil. (Etched in 2% Nital.)



Automotive spline shafts being heated in a neutral salt bath equipped with a screw-conveyor mechanism. Temperature at the work is held within 5°F., even in this relatively large bath — 6 ft. long, 2 ft. wide and 2 ft. deep.

. . . and an amazing volume of work can be treated in small, relatively inexpensive salt bath equipment.

A neutral salt bath provides an ideal means of heating carbon or alloy steel parts without any deleterious effect on the surface, such as scaling, pitting, carburizing or decarburizing. The bath completely seals out all air while work is heating . . . and a thin film of salt remains when work is removed, protecting it right up to the instant of quenching.

All "protective atmospheres," gas generating equipment and specially trained operators required for their use are eliminated . . . with corresponding savings in initial expense, operating costs and floor space requirements.

Heating cycles are 4 to 6 times faster than in atmosphere or radiant type furnaces — enabling small furnaces to handle a large volume of work — because heat is transferred by conduction rather than by convection or radiation, all surfaces of the work being in direct physical contact with the molten salt. Heating, therefore, is both rapid and uniform . . . eliminating the cause of most distortion.

Unique internal heating principle of the AJAX furnace utilizing patented, closely-spaced, immersed electrodes produces an automatic electrodynamic stirring action within the bath which contributes to faster heating of the work and assures a temperature variation of less than 5° F. throughout the bath.

This internal heating feature also permits use of long-lived ceramic pots, avoiding contamination of neutral baths by metallic oxides produced by metal pots.

The advantages of hardening in a neutral salt bath can be further enhanced by use of an isothermal salt bath quench (martempering or austempering) to hold distortion to a minimum and eliminate quench cracking.

For more information on AJAX Electric Salt Bath Furnaces and their many uses — hardening, annealing, brazing, tempering, cleaning, quenching, etc. — metallurgists and metalworking executives are invited to write on their firm's letterhead for the new 72-page Booklet No. 1168.

AJAX ELECTRIC COMPANY
952 Frankford Ave., Philadelphia 23, Pa.

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AJAX ELECTRIC SALT BATH FURNACES

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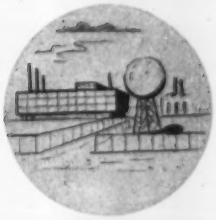

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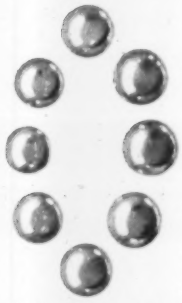
YOU'VE
MODERNIZED!

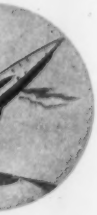


The age of the Big Change is here: the propeller is giving way to the jet... precision is giving way to super-precision... the instrument quality controls of yesterday are industrial museum pieces today... motion itself has taken a new name: *speed*.

The America that rolled along on Federal decades ago is a new America, rolling on a new Federal today. The Federal bearing that once smoothed the way for one horsepower has been modernized to do the same job with a 1-10 horsepower.

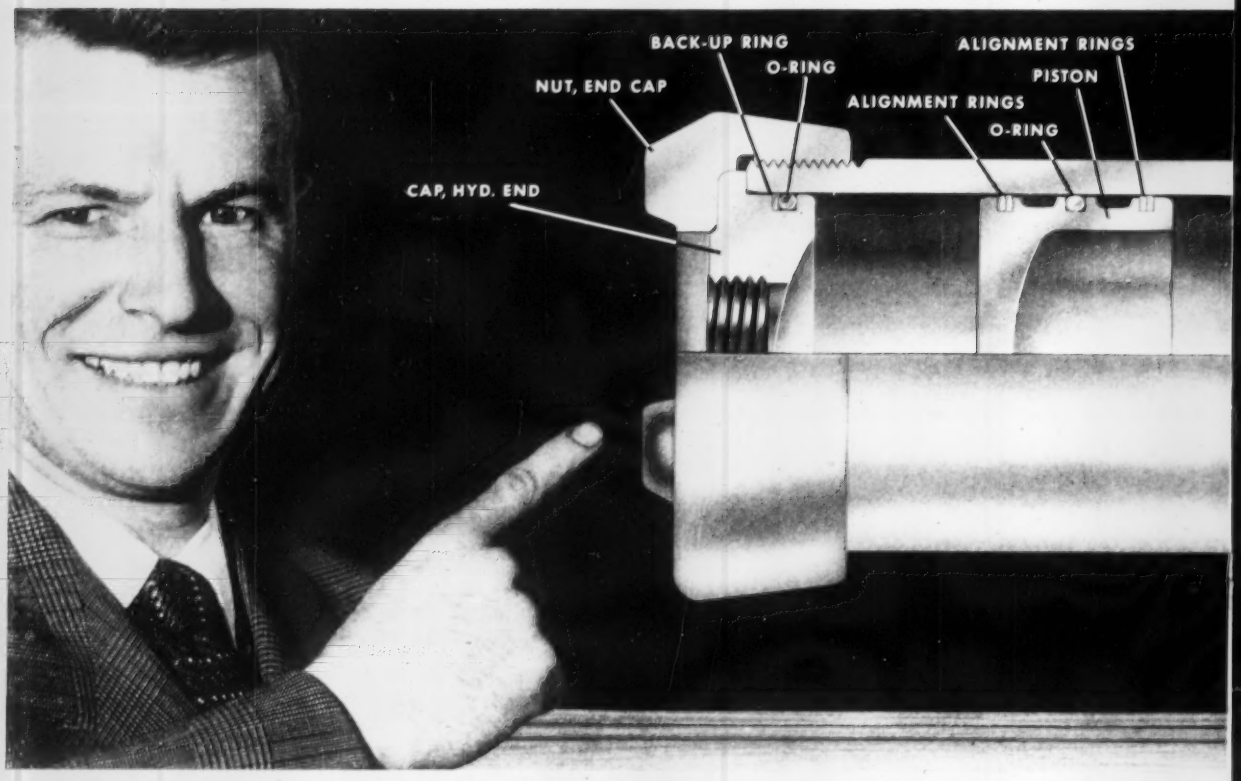
And change is the order of the day with sources of supply. The purchasing powers across America are taking a new look at the old familiar faces... are re-examining, re-appraising...are learning that yesterday's No. 2 sources of supply are ready to become today's No. 1.

Changing with change...new with the new is Federal. Take a new look at this one of the world's largest ball bearing manufacturers...then specify Federal. *Federalize and—you've modernized.*



Federal Ball Bearings

One of the world's largest ball bearing manufacturers THE FEDERAL BEARINGS CO., INC.
POUGHKEEPSIE, N. Y.
Producers of the *Modern* ball bearing



Introducing new Parker

Unique design avoids wear and maintenance, provides longer life than other types

Here at last is an industrial hydraulic accumulator that provides a longer life than conventional types.

As you see in the cutaway, construction is simple. The shell is corrosion-resistant alloy steel; the piston is aluminum. Wiper alignment rings support the piston. O-rings are used only to seal fluid and pressure. This unique design reduces frictional wear to a minimum.

The new Parker accumulator is designed for greater safety, too. During dismantling, a safety vent in the end cap warns of trapped gas pressure. It allows this pressure to escape before the end cap is removed completely.

This new accumulator is offered in eleven sizes. Lengths vary from 9⅝ to 40 inches. Inside diameters are 1½, 4, or 7 inches. Oil volume capacities range from 10 to 1155 cubic inches. Maximum operating pressure rating is 3000 psi.

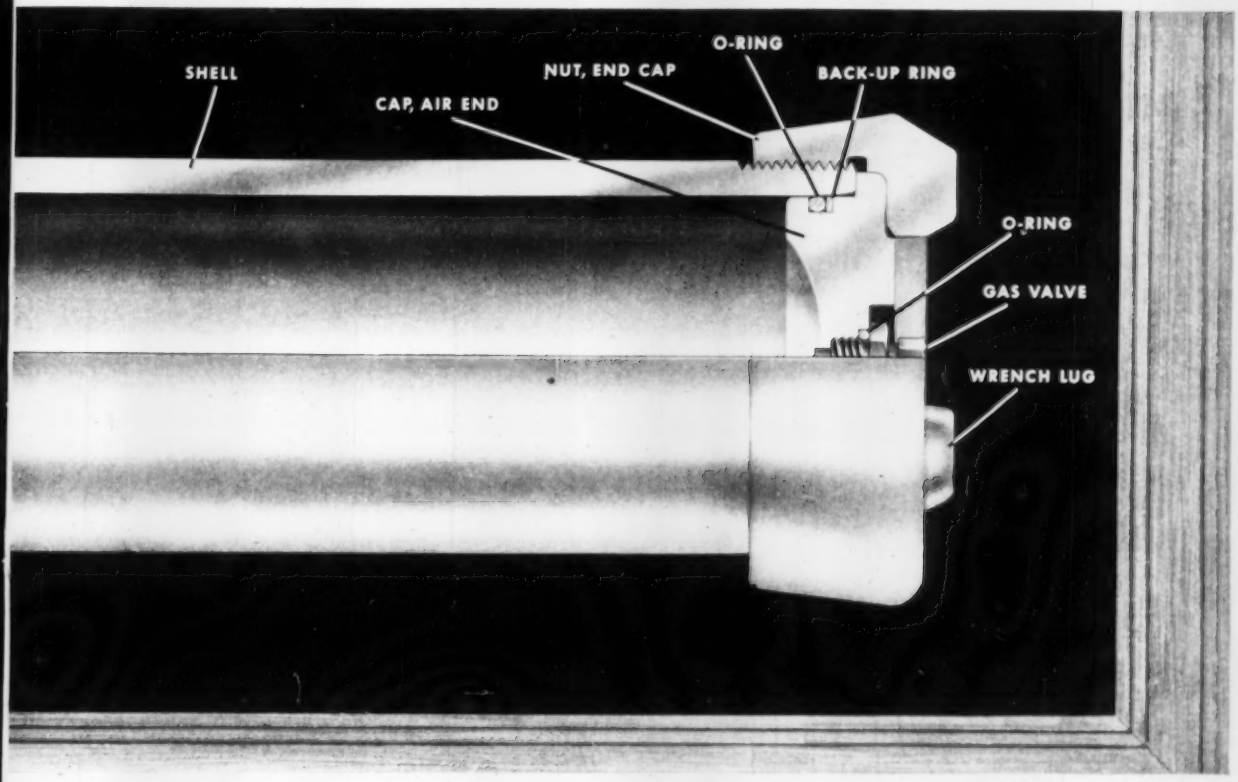
Also, for accessory use with accumulators, Parker offers a complete line of quick-opening, no-chatter check valves.

If you're not using accumulators, you'll find they can greatly simplify hydraulic system design, providing a means of steady power and saving wear on pumps. For information, mail the coupon.

INDUSTRIAL HYDRAULICS DIVISION
The Parker Appliance Company
17325 Euclid Avenue, Cleveland 12, Ohio

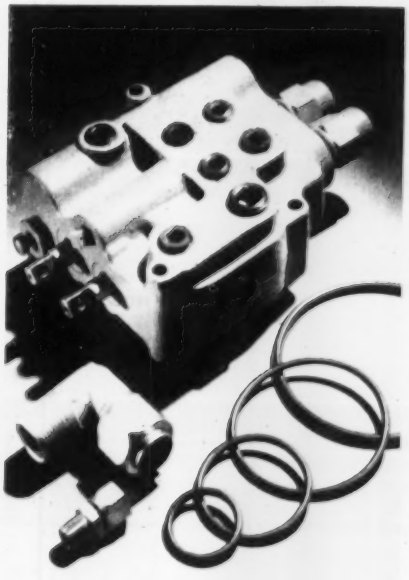
Parker

Hydraulic and fluid system components



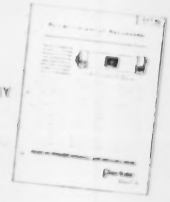
piston-type accumulator

100% safety tested on stands like this, all Parker industrial accumulators are checked at hydraulic pressures up to as high as 10,000 psi.



What other Parker products for hydraulic and fluid systems interest you? Triple-lok flare fittings? Ferulok flareless fittings? Synthetic rubber O-rings? Any other products?

THE PARKER
APPLIANCE COMPANY
Section 202-N
17325 Euclid Avenue
Cleveland 12, Ohio



Please send the following:

Accumulator Catalog File 1536A

Catalogs describing these other Parker products

NAME

TITLE

COMPANY

ADDRESS

CITY STATE

Mail this coupon for technical information about Parker's trouble-free accumulator. If you'd like to know more about other Parker products, list them on the coupon.

for speedy service... on high speed steels

_call CRUCIBLE

You get immediate delivery, direct from warehouse, when you buy from Crucible. Our national chain of warehouses, conveniently located in key cities throughout the country, have complete stocks of REX high speed steels.

These are *quality* steels — so popular over the years that the REX brand name is standard with high speed steel users. And remember — only Crucible makes REX high speed steels.

Stocks maintained of:

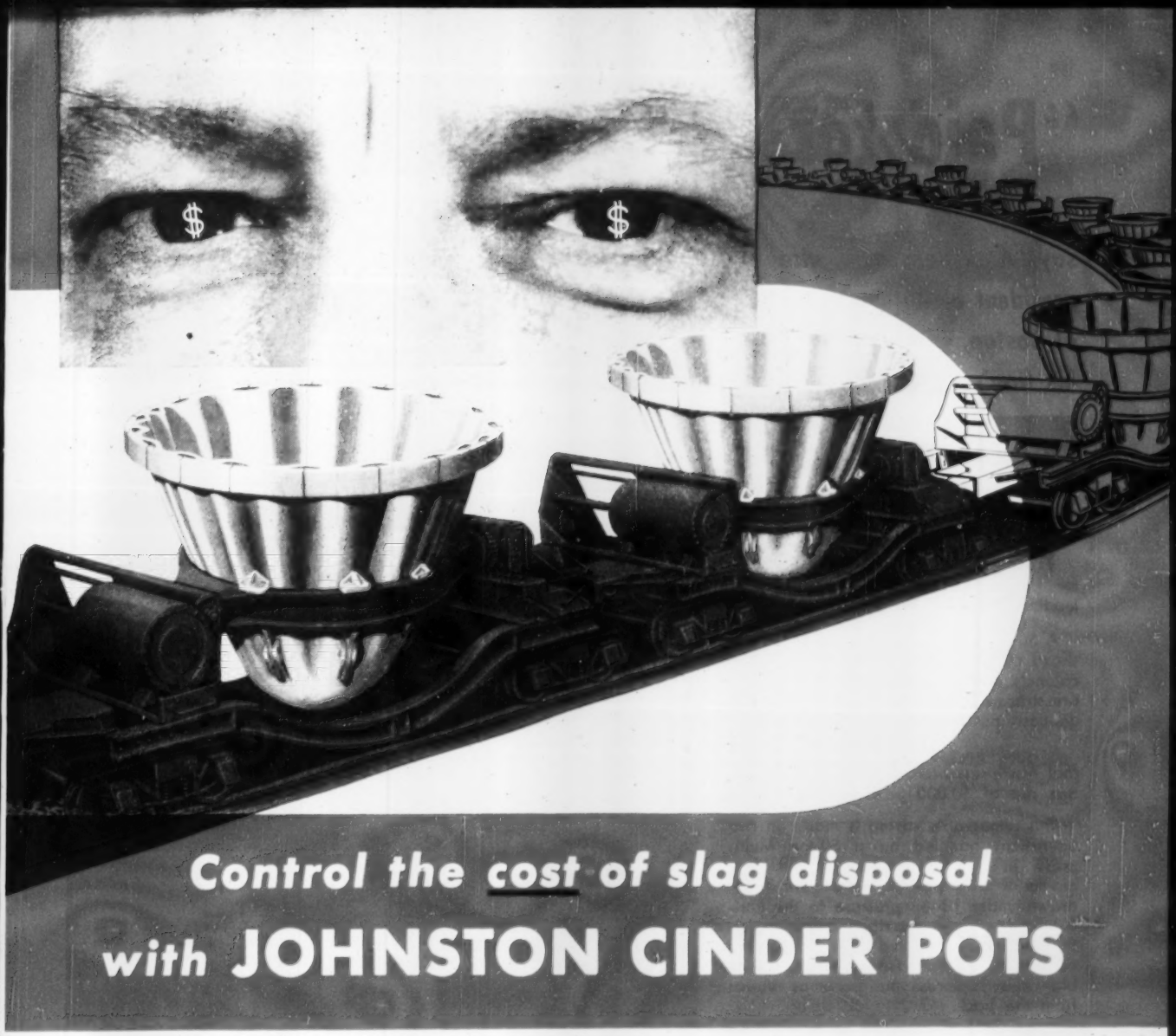
Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting and Plastic Die Steel, Drill Rod, Tool Bits and Hollow Drill Steel) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el . . . AISI Alloy, Onyx Spring and Special Purpose Steels

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **WAREHOUSE SERVICE**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DAYTON DENVER • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH PROVIDENCE • ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • ST. PAUL • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.



Control the cost of slag disposal with JOHNSTON CINDER POTS

Make a side-by-side comparison test on your own slag run. Just put a couple of Johnston Cinder Pots in the train beside those you're now using. Give them the same treatment, day in and day out.

BUT, be sure to keep a record of performance on each pot. It won't be long before you can judge the value of Johnston Cinder Pots on all of the following points:

- **free and easy expulsion of the slag**
- **absence of pot distortion**
- **rapid cooling without buckling or fire-cracking**
- **elimination of tension on pot walls by bottom suspension**

Furthermore, Johnston Cinder Pots have been fully proved in blast furnace, open hearth and electric furnace service with pot capacities ranging up to 500 cubic feet.

A descriptive bulletin containing more valuable information on Johnston Cinder Pots and Slag Handling Equipment is available – write for your copy.

MACKINTOSH-HEMPHILL COMPANY

Makers of the rolls with the striped red wobblers

PITTSBURGH AND MIDLAND, PA.

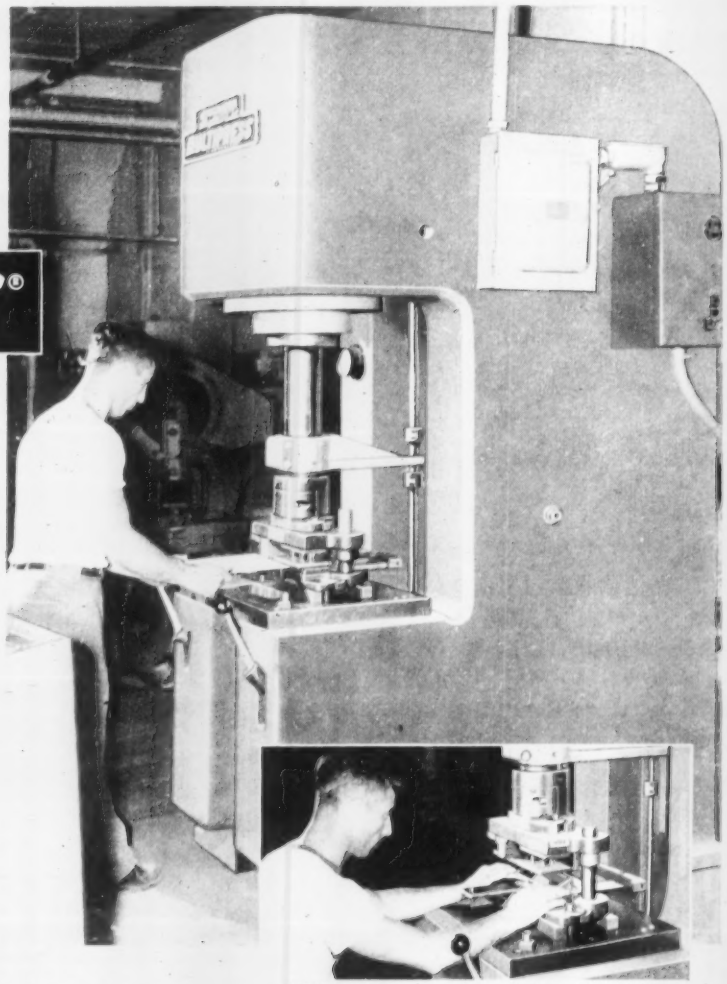
MACKINTOSH-HEMPHILL PRODUCTS INCLUDE: all types of cast mill rolls . . . improved Johnston patented corrugated cinder pots and slag handling equipment . . . Mackintosh-Hemphill rotary straighteners . . . electronically controlled contouring lathes . . . screw feed roll turning lathes . . . heavy duty engine lathes . . . shears . . . end-thrust bearings . . . steel and special alloy castings . . . reversing hot strip mills . . . Y-type cold strip mills

Join the trend to JOHNSTON CINDER POTS

"Paid for itself on 50,000 Parts"

says A. J. Houseman, vice president of Automatic Radio of Boston, in discussing his firm's use of

MULTIPRESS®



Here again, Multipress paid off fast for this manufacturer of radio sets for leading makes of cars.

A 50-ton Multipress blanks, pierces, and draws cold rolled steel to form auto radio cabinets and front escutcheon plates that are stronger and better finished than the die-casts parts they replace.

In addition, costs are so much lower that Multipress literally paid for itself on one run of 50,000 parts.

This remarkable saving is made on two operations handled on a 50-ton Multipress. In a single stroke, flat predeveloped blanks of .032 cold rolled steel are deep-drawn under 18-ton pressure to the intricate shape shown at right, below a job that ordinarily required 2 or 3 separate operations. Later, the same Multipress blanks and pierces the parts as shown from the back.

Easy, stepless adjustment of the Multipress ram effort permits pressures to be set just above the point at which dies "break through" the metal. Added to the smooth, controlled hydraulic ram action, this cuts "die punishment" to the bone. When dies become dull and fail to break through, they're quickly resharpened with minimum grind-off hence, *dies last four to five times longer than in the previous method.*

Production speeds now reach 400 per hour on blanking, 1500 per hour on the drawing and forming. On a smaller radio head of .040 chrome plated cold rolled steel, output is up to 2100 parts per hour. Scrap loss is also drastically reduced.

Automatic Radio is now adapting several other jobs to Multipress, with the idea of matching the gains made on these typical examples.

ABOVE: Clear, easy access to tooling, full visibility, easy parts loading from comfortable sitting position, and dual safety controls make Multipress popular for easy operation as well as for cost-cutting efficiency.
BELOW: Two views of a part that is first deep-drawn, then blanked and pierced, on a 50-ton Multipress that paid for itself in reduced costs on only 50,000 parts.

DENISON HydrOILics

Because both the action and pressure of its ram are so widely adjustable and are fully controlled at every stage of operation, Multipress readily meets an amazing variety of needs for fast, safe, low-cost production. Multipress is available in 9 frame sizes—bench and floor types—in capacities from one to 75 tons, with manual or automatic controls for almost any requirement. Standard Multipress feeds and accessories offer extra speed and efficiency on many types of operations. Write for full details.

THE DENISON ENGINEERING CO., 1163 Dublin Rd., COLUMBUS 16, OHIO

CALENDAR
OF MEETINGS

March 31-April 1, American Society of Mechanical Engineers: Management conference, Benjamin Franklin hotel, Philadelphia. Society address: 29 W. 39th St., New York. Secretary, C. E. Davies.

April 2-3, National Association of Cost Accountants: Ft. Worth regional conference, Hotel Texas, Ft. Worth, Tex. Association address: 505 Park Ave., New York 22. Secretary, A. B. Gunderman.

April 3-6, Packaging Machinery Manufacturers Institute: Spring meeting, Hotel Dennis, Atlantic City, N. J. Institute address: 342 Madison Ave., New York. Secretary, Helen L. Stratton.

April 5-6, Society of the Plastics Industry (Canada) Inc.: Annual conference, Mt. Royal hotel, Montreal, Canada. Society address: 67 W. 44th St., New York 36. Executive vice president, William T. Cruse.

April 5-7, American Institute of Mining & Metallurgical Engineers: National open hearth conference, Palmer House, Chicago. Institute address: 29 W. 39th St., New York. Secretary, E. H. Robie.

April 5-7, American Society of Lubrication Engineers: Annual meeting and exhibit, Hotel Netherland Plaza, Cincinnati. Society address: 84 E. Randolph St., Chicago 1. Secretary, W. P. Youngclaus, Jr.

April 5-7, Metal Treating Institute: Spring meeting, The Homestead, Hot Springs, Va. Institute address: 271 North Ave., New Rochelle, N. Y. Executive secretary, C. E. Herington.

April 5-7, National Fluid Power Association: Spring meeting, Edgewater Gulf hotel, Edgewater Park, Miss. Association address: 1618 Orrington Ave., Evanston, Ill. Executive secretary, Barrett Rogers.

April 5-8, American Management Association: National packaging exposition and conference, Convention Hall and Auditorium, Atlantic City, N. J. Association address: 330 W. 42nd St., New York 36. Vice president, secretary, James O. Rice.

April 6-7, Machine Tool Electrification Forum: Westinghouse Electric Corp., sponsor. Hotel statler and Westinghouse works, Buffalo. Information, N. C. Mayer, Westinghouse, East Pittsburgh, Pa.

April 6-9, American Leather Belting Association: Spring meeting, The Homestead, Hot Springs, Va. Association address: 220 Broadway, New York 7. Executive vice president, E. E. Rath.

April 7-9, International Acetylene Association: Spring meeting, Palmer House, Chicago. Association address: 30 E. 42nd St., New York 17. Secretary, H. F. Ecklund.

April 11-13, American Trucking Associations Inc.: Annual conference, Palmer House, Chicago. Association address: 1424 16th St., NW., Washington 6. Managing director, John V. Lawrence.

April 11-15, American Hardware Manufacturers Association: Spring meeting, Roosevelt hotel, New Orleans. Association address: 342 Madison Ave., New York 17. Secretary, Arthur L. Faubel.

April 12, Society of Automotive Engineers: Annual automobile production forum, Hotel Statler, New York. Society address: 29 W. 39th St., New York 18. Secretary and general manager, John A. C. Warner.

April 13, Material Handling Institute Inc.: Spring meeting, Drake hotel, Chicago. Institute address: 943 Clark Bldg., Pittsburgh 22. Secretary, N. F. Young.

April 13-14, American Institute of Steel Construction: Annual national engineering conference, Hotel Schroeder, Milwaukee, Wis. Institute address: 101 Park Ave., New York 17, N. Y. Secretary, M. Harvey Snadley.

April 13-14, Industrial Truck Association: Spring meeting, Drake Hotel, Chicago. Association address: Washington Loan & Trust Bldg., Washington 4. Secretary, William Van C. Brand.

April 14-16, Society for Experimental Stress Analysis: Spring meeting and exhibit, Hotel Netherland Plaza, Cincinnati. Society address: P.O. Box 168, Cambridge 39, Mass. Secretary, W. M. Murray.

CHECK THESE BIG VALUES! 4

For use in:
METAL BLASTING
CLEANING
PEENING
TUMBLING
CUTTING
ABRADING

Harrison L/D Cut-Wire Shot provides these four outstanding advantages:

✓ **LONG LIFE**	Lasts many times longer than any cast shot. Stands up against thousands of impacts.
✓ **UNIFORM SIZE**	Cut to specific sizes. Each particle size provides same impact and same finish.
✓ **UNIFORM HARDNESS**	Variable hardness of malleable iron or steel shot is avoided—each piece is the same.
✓ **LOWER COSTS**	You save on total abrasive cost, labor, maintenance, machine time, handling and storage.

Send for TECHNICAL BULLETIN No. 7 "Cut Wire Shot —Its Development and Use"

Available in Steel, Copper and Stainless, in a range of wire diameters and other properties. Can also be produced from any desired type of wire with sizes varied as to relation of length to diameter.

HARRISON ABRASIVE DIVISION
METALS DISINTEGRATING COMPANY, INC.
Elizabeth B, New Jersey

Also producers of HARRISON CHILLED SHOT—HARRISON DIAMOND GRIT

2960 SUBSIDIARY OF AMERICAN-MARIETTA COMPANY

This little red wagon presented a big drawing problem!

A Standard engineer's advice helped cut rejects by over 90%

● In the manufacture of children's wagons at the Steger Products Manufacturing Company in Steger, Illinois, 20-gauge cold rolled steel is drawn to a 4½" depth. Of the 8-hour shift capacity of 1600 to 1800 wagon bodies, up to 20% formerly wound up as rejects. Also, it was necessary to clean the dies after every 10 to 15 bodies. A single small scratch on the die caused excessive die galling and torn or ruined bodies.

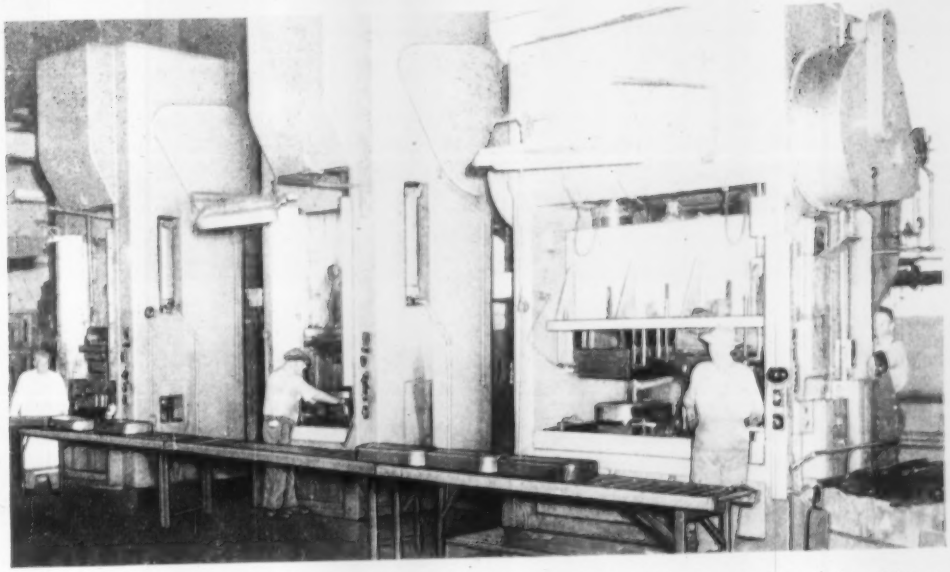
The company tried 10 or more drawing compounds without solving the problem. Then a Standard Cutting Oil Engineer suggested STANICOOL HD Soluble Oil.

That was six years ago and STANICOOL HD is still on the job. The reject rate has been reduced to less than 1% a day. Die galling has come down to almost nothing. Dies are now cleaned only once or twice daily. Again, Standard Oil's metalworking products prove they can do the hard jobs better!

STANICOOL HD Soluble Oil: for cutting and grinding operations, for certain forming operations. Mixes readily, non-irritating, anti-rust. To take full advantage of this many-purpose cutting fluid, call on the services of your Standard Oil Cutting Oil Engineer. If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois, to secure the services of the Standard Cutting Oil Engineer nearest you.

Standard's Bill Easterwood worked with the Steger Company on their drawing problem. Specially trained, Bill Easterwood is one of a corps of cutting oil and lubrication engineers headquartered near your plant throughout the Midwest. There's a specialist to assist you with *your* lubrication problem.

At Steger, die cleaning is of major importance because a single scratch can result in torn or ruined bodies during the processing. Since the introduction of STANICOOL HD, the time-consuming die-cleaning operation has been rapidly reduced to an *effective* minimum.



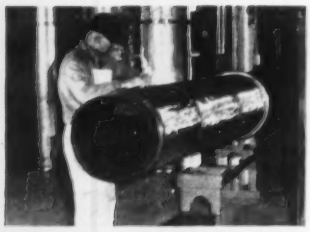
In this deep-draw operation STANICOOL HD is used just as it comes from the barrel without the addition of water. The 22-gauge cold rolled steel is drawn to a depth of 4½". The sheets are dabbed with STANICOOL HD as they are put on the press. Breakage which formerly had been a major problem has been reduced to a point where it is no problem at all.

STANDARD

STANDARD OIL COMPANY *(Indiana)*

A complete line of metalworking products including: STANICUT Cutting Oils. Special duty cutting oils with correct proportions of extreme-pressure and friction-reducing ingredients. STANOSTAMP Compounds. Three established products for stamping or heavy drawing operations on either low-carbon or alloy steels. SUPERLA Quenching Oil. For quenching work on systems where cooling facilities are limited and bath temperatures are high; efficient quenchings of large forgings.

Stainless Steel here...



and Stainless Steel here...

U.S. AIR FORCE
92515

HELP RESIST HEAT HERE

To withstand the scorching blasts that thunder through them, jet engine tailpipes and exhaust cones are made of Republic ENDURO Stainless and Heat-Resisting Steel.

There's an idea here for manufacturers whose products or process equipment may be prematurely aging due to high temperature conditions.

As the jets have proved, ENDURO resists heat. In great quantities. For a long time. And, it offers much more. It stubbornly resists rust and corrosion. It resists abrasion and denting. It maintains its great strength at wide temperature extremes. It provides that strength without prohibitive weight and bulk. It stays easy to clean. It is easy to fabricate.

For your future designs, ENDURO is available in many forms—sheets, strip, cold-finished bars, forging bars, wire and tubing. Through Republic's exclusive "Three-Dimension Metallurgical Service," you get help in applying ENDURO Stainless and Heat-Resisting Steel most efficiently and economically.

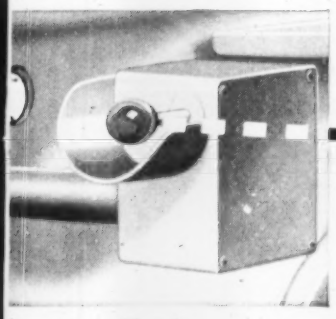
REPUBLIC STEEL

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department:
Chrysler Building, New York 17, New York

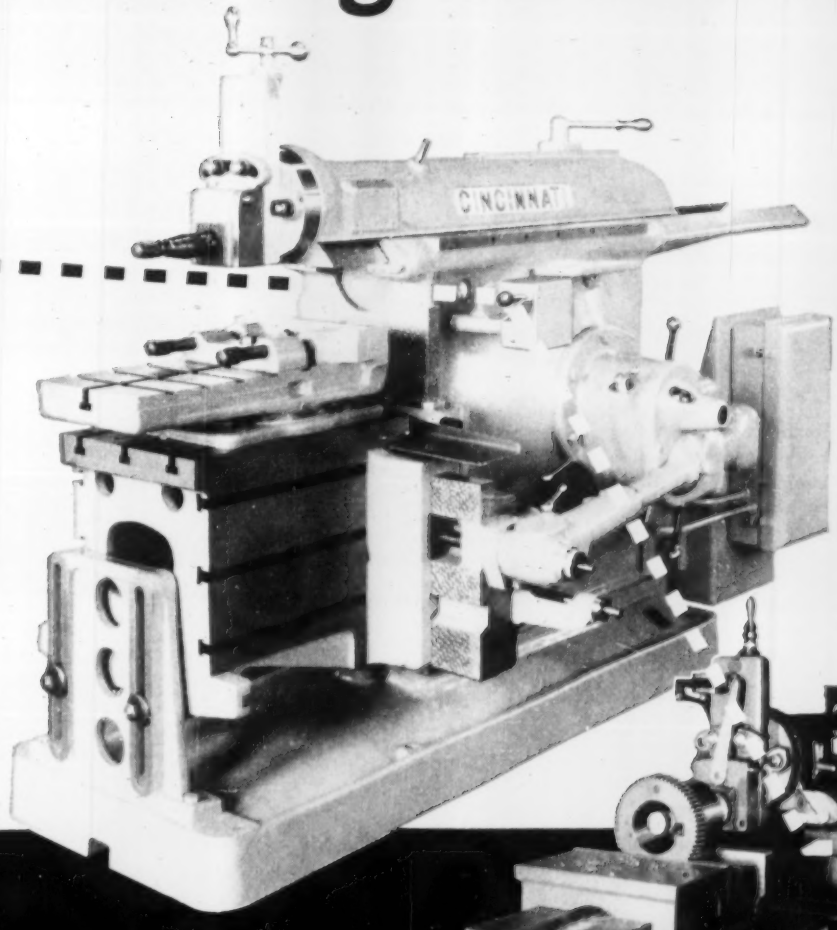
REPUBLIC
ENDURO STAINLESS STEEL

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Outstanding Time Saver...
...Outstanding ACCURACY



Single
Control
Lever



The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, gives the operator the fastest, simplest and most accurate control of his Shaper and converts waste time into productive time.

This powerful clutch and brake requires no adjustment, and has a long, maintenance-free life.

Write for Cincinnati Shaper Catalog N-5.

30% Time Saving

Shaping time on 7 internal oil grooves in these steel sleeves was reduced from 12.8 minutes to 8 minutes, by the Cincinnati Electro-Magnetic Clutch and Brake.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

Production costs cut 90%

WITH GRAY IRON

Gear cover fabricated from nine pieces. Arrows show cut outs.

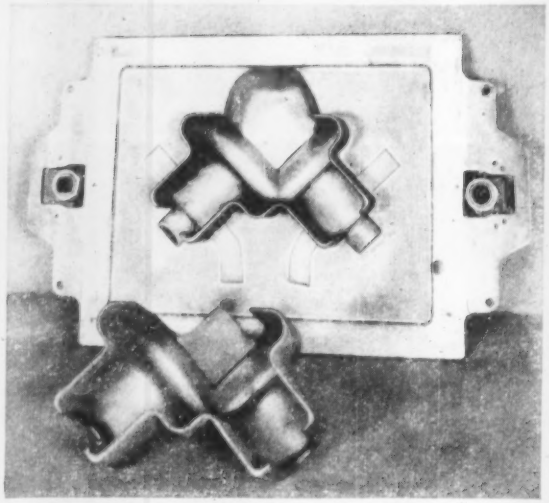
Made entirely in green sand, the Gray Iron castings were produced at one-tenth the cost of fabricated gear cover.

Formerly, nine separate pieces were shaped and welded into a fabricated gear cover for a braiding machine. Then, the manufacturer redesigned the gear cover for production in Gray Iron.

The finished and machined casting cost *less than 10%* of the production cost for the fabricated piece. This saving quickly paid for pattern-equipment costs . . . netting a *90% saving* on all parts thereafter. By redesigning for Gray Iron, the manufacturer not only made substantial savings, but obtained the advantages of a streamlined, vibration-absorbing gear cover.

Look at the structural and functional requirements of your fabricated parts. You can undoubtedly use the unique characteristics of Gray Iron and the economy offered by this casting process. Why not write us for more information?

Matchplate and gear cover.



GRAY IRON CHARACTERISTICS INCLUDE:

Castability	Low Notch Sensitivity	Corrosion Resistance
Strength	Wear Resistance	Durability
Rigidity	Heat Resistance	Vibration Absorption
	Machinability	

MAKE IT *BETTER* WITH GRAY IRON

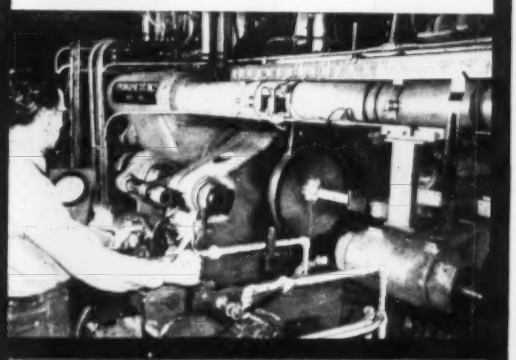
75% of all cast metal products are Gray Iron

GRAY IRON FOUNDERS' SOCIETY, INC.

NATIONAL CITY-E. 6th BLDG., CLEVELAND 14, OHIO

LOEWY-HYDROPRESS

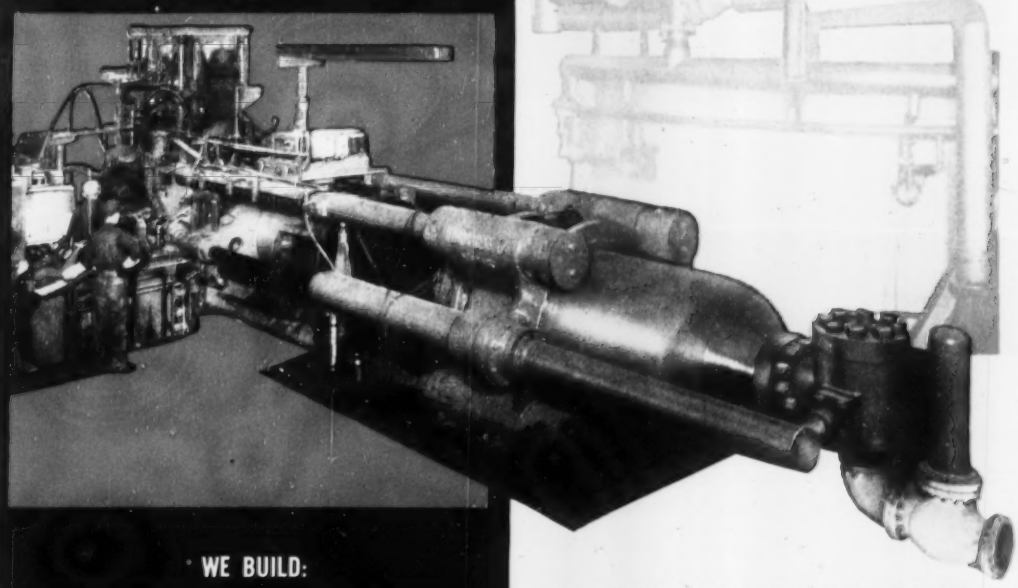
FIRST



IN EXTRUSION OF STEEL

the first two steel extrusion presses ever to go into commercial operation in United States . . . in two leading steel companies

SPECIALLY DESIGNED FOR HOT EXTRUSION OF STEEL



Loewy-Hydropress Extrusion Press for the production of seamless tubing and shapes from stainless steel and special alloys. Installed at the Beaver Falls, Pa. plant of the Tubular Products Division of The Babcock & Wilcox Co.

WE BUILD:

Extrusion Plants for Steel and Non-Ferrous Metals • Open and Closed Die Forging Plants • Deep Drawing Single and Double Acting Presses • High-Pressure Pipe Testing and Expanding Machines • Hot and Cold Rolling Mills for Steel and Non-Ferrous Metals • Stretching and Detwisting Machines for Extruded Shapes and Sections • Sheet and Plate Stretching-Levelling Machines • Marform High Pressure Rubber Forming Presses

Your Future Inquiries Are Invited

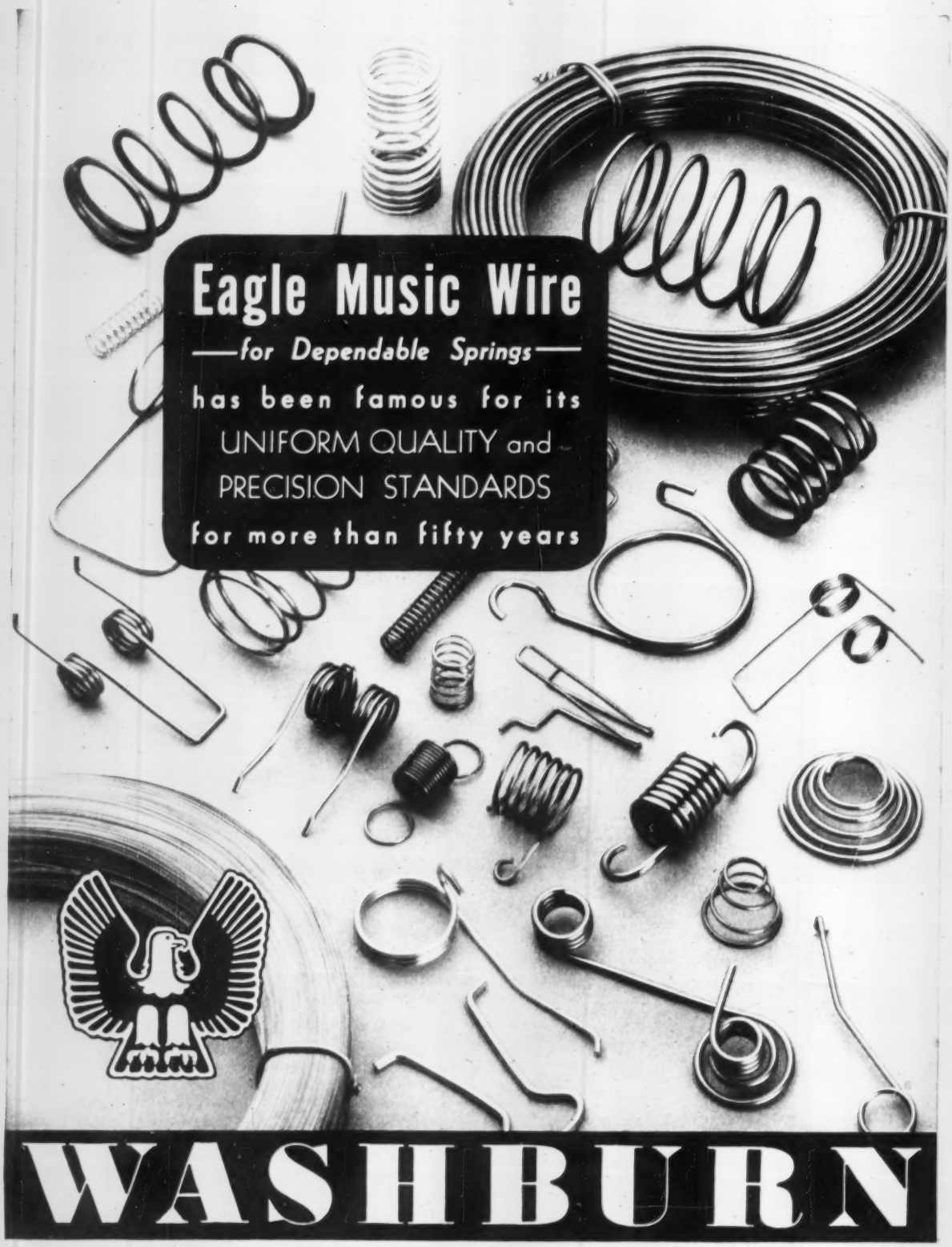
LOEWY HYDROPRESS INC.

ENGINEERS • CONTRACTORS

350-A Fifth Avenue, NEW YORK 1, N. Y.

Rolling Mills • Hydraulic Presses • Pipe Testing Machines • Special Pipe Mill Equipment • Accumulators • Pumps

Birmingham • Chicago • Cleveland • Detroit • Los Angeles • Phoenix • San Francisco • Seattle • Washington, D. C. • Wheeling • Genoa, Italy • London, England • Madrid, Spain • Paris, France • Philippine Islands

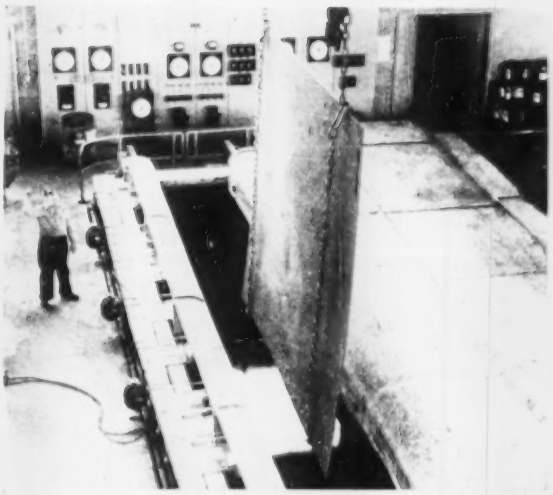


WASHBURN WIRE COMPANY, NEW YORK CITY

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

You can quickly descale work of any size or shape

with the

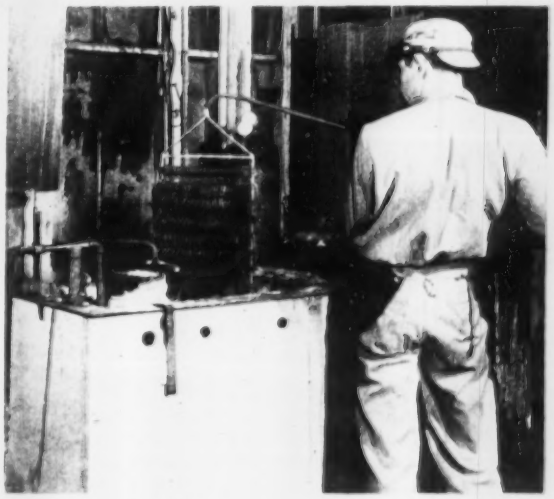


DU PONT SODIUM HYDRIDE DESCALING PROCESS

There's no limit to the size or shape of parts that can be thoroughly descaled with the versatile Du Pont Process. Sodium hydride descaling works as efficiently on small precision parts weighing ounces as on large steel plates weighing tons!

This range of performance is just one of the many profitable advantages of the modern Du Pont descaling process. You can completely descale most metals separately or in combination in just *one* fast cycle (10 to 20 minutes)—retreatments are rarely needed. There's never any danger of pitting or etching, never a costly reject due to loss of gauge. Base metal is *always* protected since bath action stops the instant scale has been reduced. And expensive scale-breaking operations (necessary for older descaling methods) are eliminated entirely!

If you are descaling metals which are unaffected by fused caustic at 700°F., it will be to your advantage to talk with us about the Sodium Hydride Process. Du Pont pioneered this modern descaling method and can bring a depth of technical experience to bear on your descaling problems. There's no cost for this service, which includes expert aid in the construction, installation and operation of the process. Just call our nearest district office or send the coupon below.



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Check coupon below for booklet describing the Du Pont Sodium Hydride Descaling Process—how it works—what it can do for you.

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department, S-3295
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- [ ] Please send me your free booklet on Sodium Hydride Descaling.
- [ ] Please have one of your technical men call. I am interested in descaling _____

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Sodium hydride process for positive descaling

DU PONT

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Why not use the space up here?

Put that valuable *overhead* space to *work* in your plant! Do it by moving and lifting with a Whiting Trambeam Overhead Handling System! You'll turn *overhead* into profit by utilizing *all floor space* and saving man-hours. You'll improve housekeeping, speed production and reduce handling costs. Write today for Field Reports showing the many applications of Whiting Trambeam Systems.

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Whiting Corporation also manufactures Railroad and Aviation Equipment, Swenson Chemical Processing Equipment and Metal working Machinery

Whiting Trambeam Crane quickly and efficiently stacks steel rods in warehouse of Crucible Steel Co. of America, Indianapolis.

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MILL PRODUCTS
The most complete line in Aluminum

Sheet and Plate—

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For most applications calling for a combination of corrosion resistance and light weight, Alcoa® Aluminum Tube and Pipe can cut material costs—often by as much as 50 per cent. It will pay you to consider Alcoa tubular products as carriers of liquids and gases and for use in bridge railings, scaffolds, handrails and stanchions.

Low cost is immediately apparent when you compare Alcoa Aluminum with other corrosion-resistant materials. Still other savings are effected through ease of fabrication and minimum requirements for maintenance—no costly painting when exposed to weathering.

Low cost Alcoa Aluminum Tube is used for many heat exchanger and condenser applications. In one intercooler installation, Alcoa Heat Exchanger Tubes were still in service after 12 years, while steel tubes were replaced after only five years. Alcoa Tube also insures against contamination or discoloration of fuel, lubricants or fluids common to process industries.

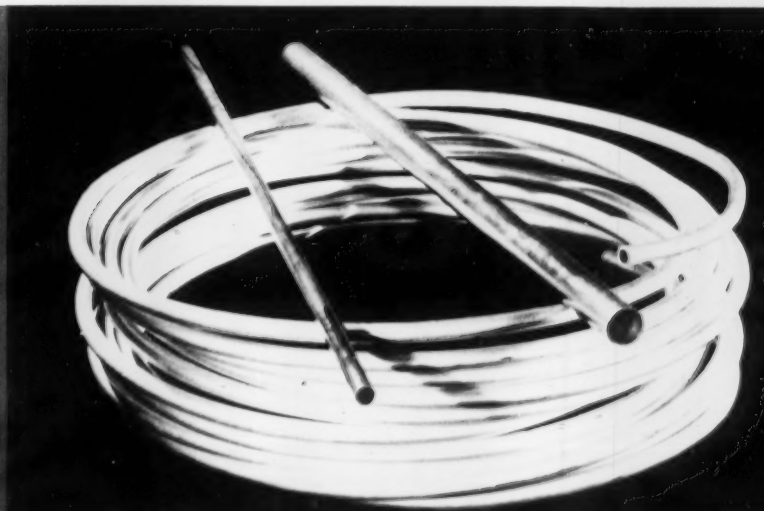
Light weight means you get three times as much footage per pound with Alcoa Aluminum tubular products as with heavy metals. It makes scaffolds and ladders easier to move, facilitates handling of long lengths.

Alcoa Aluminum tubular products include coiled tube; Alcoa® Utilitube; straight tube in round, square and rectangular shapes; standard pipe and fittings; construction pipe; heat exchanger tubes and rigid conduit. The world's greatest fund of aluminum knowledge is readily available from your local Alcoa sales office to help you put them to use.

Lightweight, corrosion-resistant,

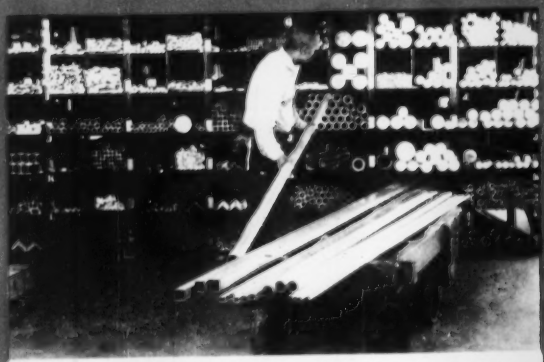
Alcoa Tube and Pipe

Can cut material costs 50%.

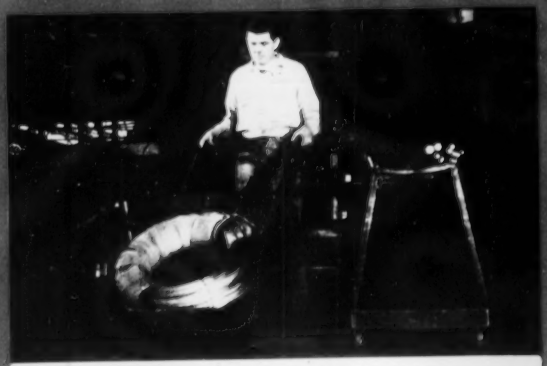


Products of Sixty-Five Years of Pioneering in Aluminum

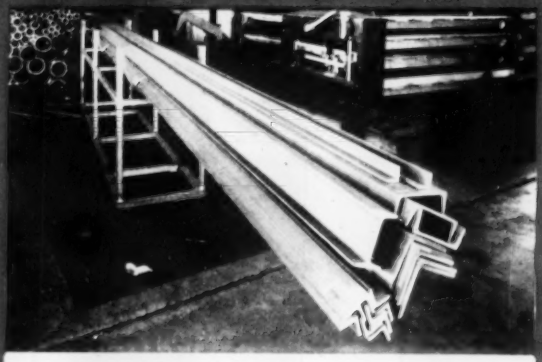
EXTRUDED SHAPES: For thresholds; window sills; door frames; glass stops; copings; gravel stops; trim; truck bodies. Also angles; channels; tees; zees; etc., for structures.



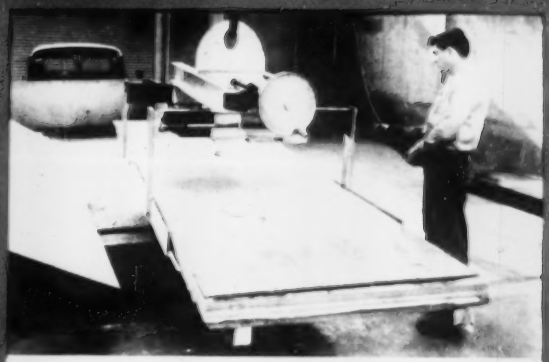
TUBE AND PIPE: Coiled tube; Alcoa Utilitube; straight tube in round, square and rectangular shapes; heat exchanger tubes; standard pipe and pipe fittings; construction pipe; rigid conduit.



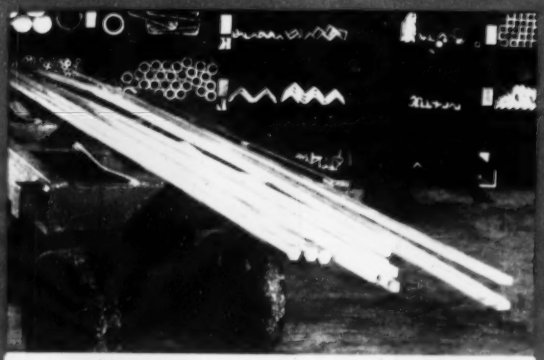
WIRE AND ROD: Coiled and straight length; flattened wire; rivet wire and rod for die heading operations in manufacture of rivets, nails, bolts and screws.



ROLLED SHAPES: Equal angles; unequal angles; channels; I-beams; tees; zees. Suited to a variety of structural applications.

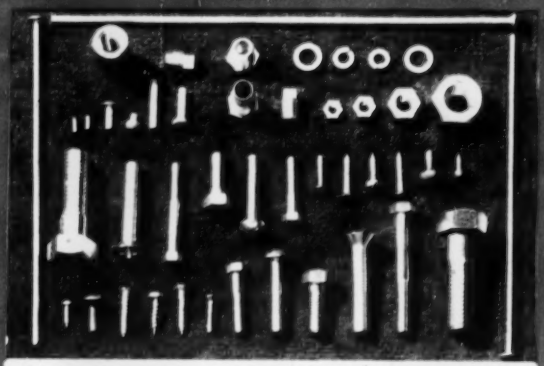


SHEET AND PLATE: Flat and coiled sheet; circles; patterned sheet; plate; tread plate; roofing and siding sheet; roofing accessories and fasteners; specialty sheet.

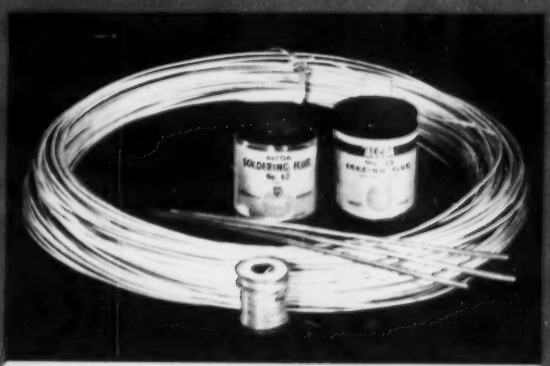


BAR STOCK: Square, hexagonal and rectangular in all commercial alloys. Rolled and cold finished to final dimensions for superior tolerance and finish.

SCREW MACHINE STOCK: Available in 11S-T3, the free-cutting alloy and 11S-T4, a higher strength alloy plus 24S, 61S and 75S.



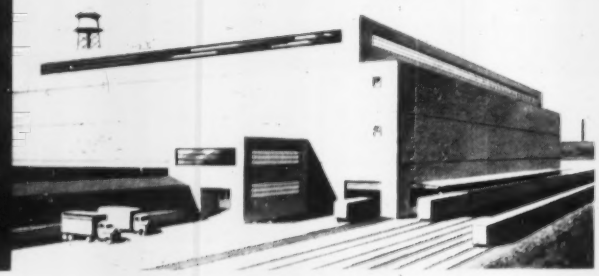
FASTENERS: Machine screws, wood screws; washers; nuts; bolts; rivets. Recommended for fastening aluminum to prevent electrolytic damage.



WELDING AND SOLDERING: Welding and brazing wire; welding and brazing flux; solder flux; solder.

Your Alcoa Distributor has Alcoa Standard Warehouse items in stock

Your Alcoa Distributor is as near as your telephone and his warehouse is stocked with the aluminum products you need for fast, economical production. His facilities include modern equipment for sawing, shearing and slitting stock to your specifications and for making prompt deliveries.



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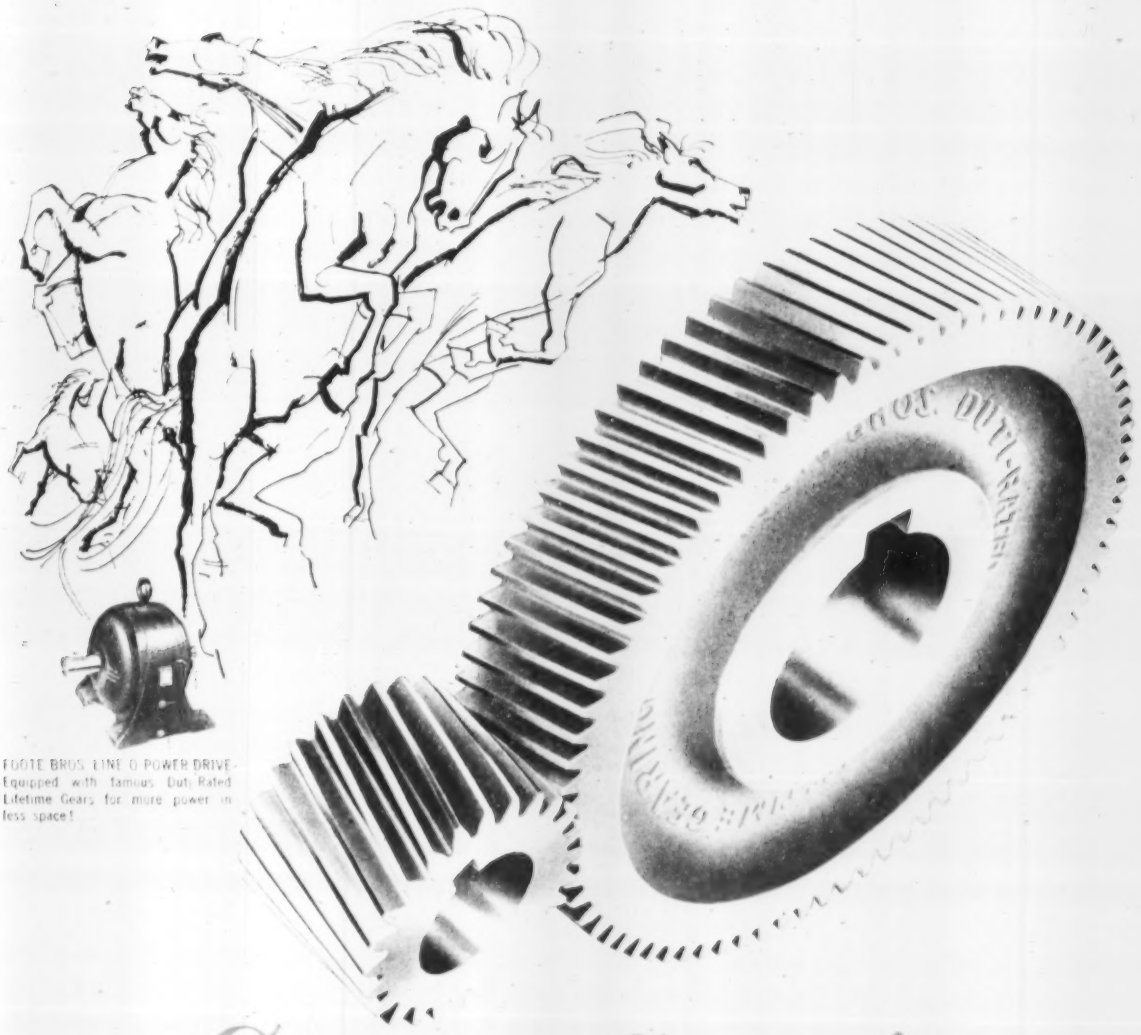

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Better Power Transmission through Better Gears

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WITH FOOTE BROS.

Duti-Rated LIFETIME GEARING

A unique development in industrial gear production . . . new, *Duti-Rated Lifetime Gears* . . . a Foote Bros. exclusive! From its vast experience as a leader in aircraft-quality gear manufacture, Foote Bros. has applied the important characteristics of aircraft gearing to its *industrial* gear production. The results are highest quality gears with greatly reduced mass, longer life and higher capacity than ordinary industrial gears. What's more, Duti-Rated Lifetime Gears can *actually cost less* than other gears of similar capacity! The time to investigate is *now* . . . the gears to specify are *Duti-Rated Lifetime Gears!*

WRITE FOR COMPLETE DETAILS . . . on how Foote Bros. Duti-Rated Gears can fit into your picture. Write *today* . . . for better power transmission *tomorrow!*

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PHOSPHATE COATINGS TO MAKE YOUR PRODUCT DURABLE*

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For more than a third of a century, ACP research chemists and ACP technical representatives in the field have pioneered in the science of metal preservation. They have developed surface treating chemicals which either protect metals directly, or create a superior bond for decorative and protective paint finishes, and now, ACP chemicals and processes are being used the world around to reduce costs, speed production and add to the life-span of countless products.

ACP metal protective chemicals include: protective coating chemicals for steel, zinc and aluminum; metal cleaners and rust removers; final rinse controls; pickling acid inhibitors; copper coating chemicals; soldering fluxes; alkali cleaners and addition agents; copper stripping and brightening solutions.

PAINT BONDING

"GRANODINE"® zinc phosphate coatings improve paint adhesion on automobiles, refrigerators, projectiles, rockets, and many other steel and iron fabricated units or components.

"LITHOFORM"® zinc phosphate coatings, make paint stick to galvanized iron and other zinc and cadmium surfaces.

"ALODINE"® protective coatings provide improved paint adhesion and high corrosion-resistance for aircraft and aircraft parts, awnings, wall tile, signs, bazookas, and many other products made of aluminum.

RUST PROOFING

"PERMADINE"® zinc phosphate coatings provide rust and corrosion proofing for nuts, bolts, screws, hardware, tools, guns, cartridge clips, and many other industrial and ordnance items.

PROTECTION FOR FRICTION SURFACES

"THERMOIL GRANODINE"® manganese-iron phosphate coatings provide both rust proofing and wear resistance — anti-galling, safe break-in, friction on rubbing parts.

IMPROVED DRAWING AND COLD FORMING

"GRANODRAW"® zinc phosphate coatings make possible improved drawing, cold forming and extrusion on such steel products as sheets for stamping, bumpers, parts to be formed, prior to plating or painting, cartridge cases, etc.

Made, Sold, and Serviced By A Pioneer In Protective Coatings For Metals . . .

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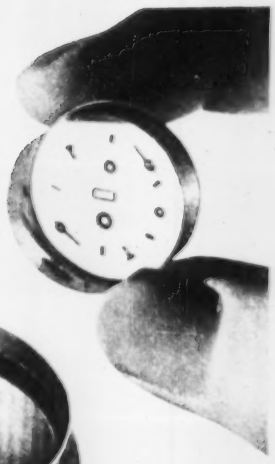
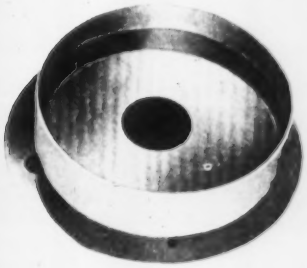
Tiny?

Yes! The No. 11 Blanchard Surface Grinder grinds these ladies' watch gears, pinions and ruby bearings flat and parallel, and to a dimension tolerance of .0002".



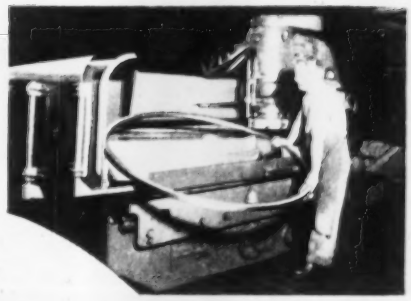
Smooth?

Of course! The Blanchard No. 11 finished this refrigerator plate, seen through an optical flat, to 3 micro inches and flat within 1 light band (.0000118").



Accurate?

Sure . . . and easy, too! This Blanchard grinds 84" forged steel rings flat within .0002", parallel to .0002", dimension tolerance of ±.0005", and with surface finish of 4 micro inches.



Tremendous?

Yes . . . but fast! This 88" diameter cast-iron plate was ground on a No. 12-72-84 Blanchard in 3½ hrs., floor to floor. ¼" of stock – 1520 cu. in. – 330 lbs. was removed.

If you produce flat surfaces, your best bet is Blanchard Grinders – with Blanchard Wheels!

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Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

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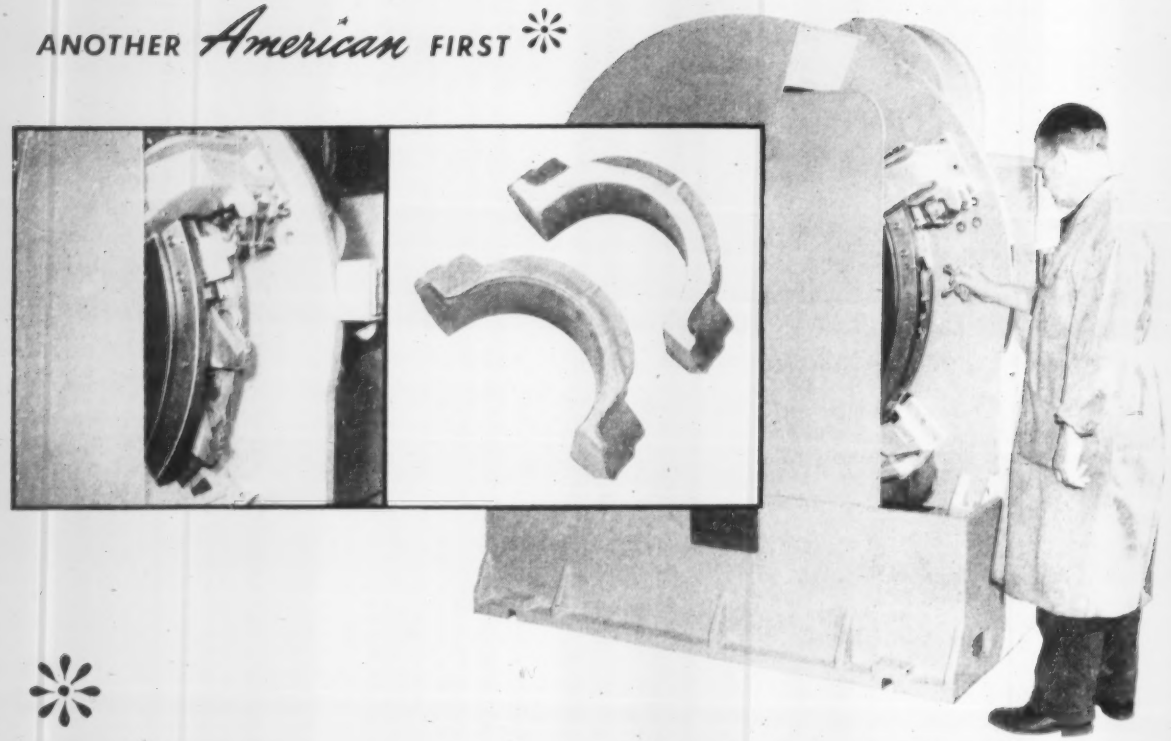

STRADDLE BROACHING ON ROTARY MACHINE MEETS HIGH-SPEED PRODUCTION DEMANDS

1000 connecting rod caps broached per hour —

Continuous, automatic broaching is a necessity on some high production jobs. When required and the nature of the work permits, American engineers develop special, revolutionary machines to solve bottlenecks and reduce metal removal costs to the lowest possible point..

A typical example is this special 36" Rotary Continuous Surface Broaching Machine. It is designed to straddle broach two sides of a connecting rod cap. The production cycle is continuous. The operator manually loads parts into the holding fixture. As the part moves into broaching position it is automatically clamped, broached, unclamped, and ejected into the chute at the bottom of the machine. Operating at 75% efficiency, this American machine is capable of producing 1000 parts per hour. The connecting rod cap is a steel forging.

For practical, high production, low cost solutions to your metal cutting problems see American first. A sample part or detail drawing and mention of your production requirements will receive prompt attention from American.

Write today for American Circular 300 which gives you data on standard American Vertical Hydraulic Surface Broaching Machines.

AMERICAN *American* BROACH & MACHINE CO.

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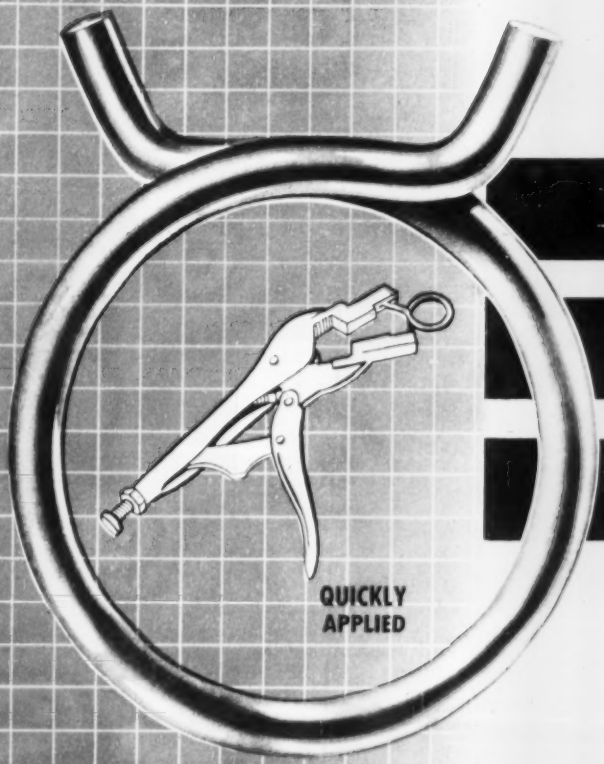
See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



Eaton-Reliance

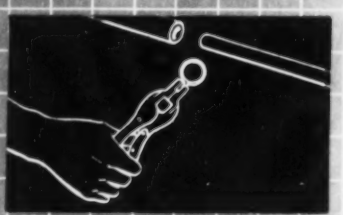
HÖZ-FAS-NERS

Simplify Production

Reduce Costs

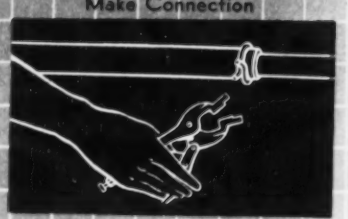
From time to time on the industrial scene, there appears a new product, which because of its simple design, but revolutionary concept, offers immediate and immense value to engineers and production men. Such is the case of the Eaton Reliance HOZ-FAS-NER. Ideally suited for fastening rubber, plastic or fabric hoses, the Eaton Reliance Hoz-Fas-Ner grips tightly, seals effectively and maintains uniform automatic tension regardless of expansion and contraction of the hose.

The initial cost is low, it is rust resistant and re-usable. No maintenance is required. It will speed production because of its ease of application . . . especially in "hard-to-get-at" places. Let us send you detailed information as found in our Engineering Folder No. 1. Write today . . . no obligation, of course.



Squeeze Open and Slip on Hose

Make Connection



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from A Century of Iron and Men
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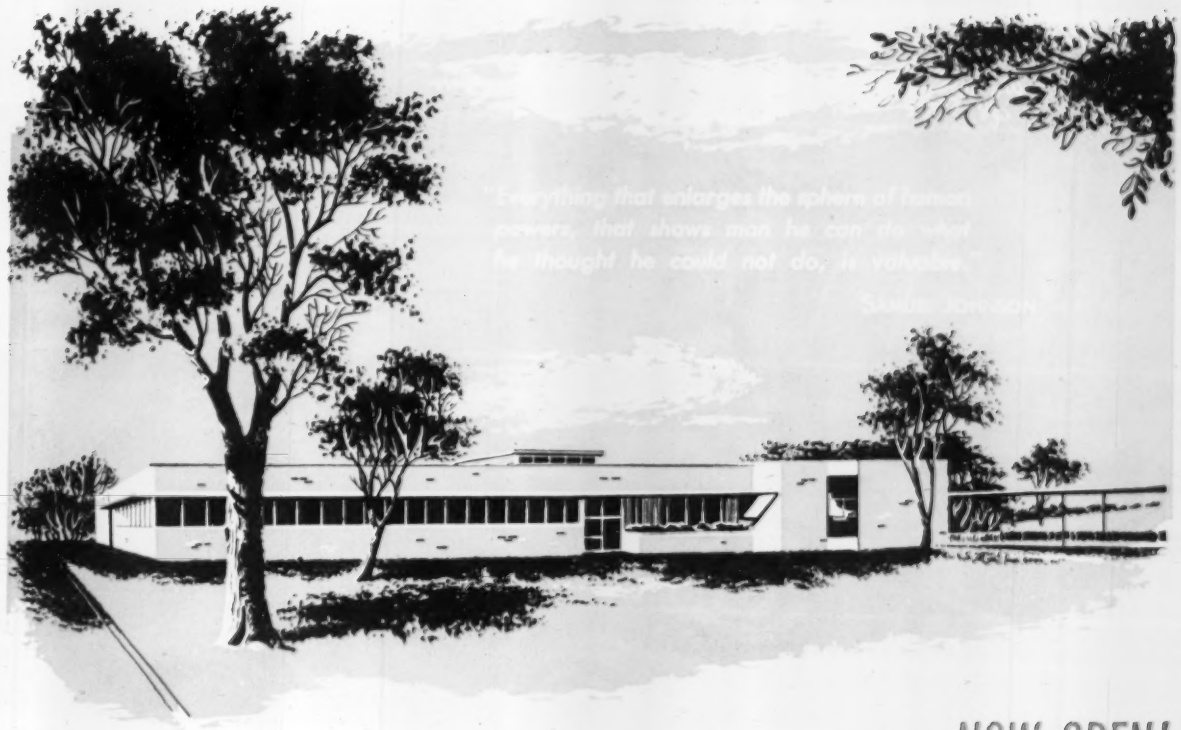

Udylite Research Corporation Laboratory—**NOW OPEN!**

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Every time Industry turns the doorknob of a new research plant, it opens the door to Progress. The formation of The Udylite Research Corporation and the opening of the largest, most completely equipped research building in the industry are important steps forward in the progress of metal finishing.

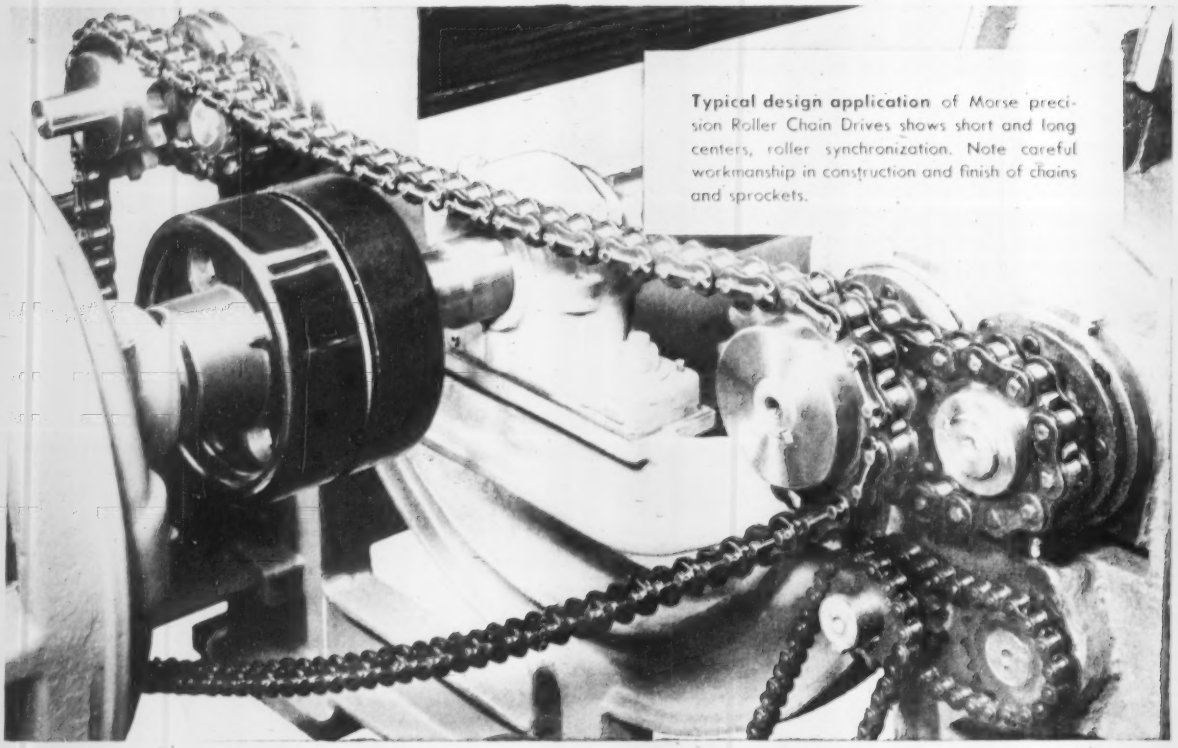
Out of Udylite's laboratories during the past quarter century have come a score or more major contributions to the art of electroplating. This pioneering has helped the plating industry to grow through the development of improved processes, more efficient equipment and supplies.

With its new research building, containing a complete pilot plant, six specialized laboratories and the complete metal finishing library, Udylite will expand its research at an accelerated pace, continuing as the source of new and better ways of metal finishing.

The industrial developments of the future are fast becoming problems of the present. The progress of the metal finishing industry in meeting these challenges is now more assured. For Progress moves through the people of research . . . and now Progress has a brand new "home."

PIONEER OF A BETTER WAY IN PLATING

THE **Udylite** CORPORATION
DETROIT 11, MICHIGAN



Typical design application of Morse precision Roller Chain Drives shows short and long centers, roller synchronization. Note careful workmanship in construction and finish of chains and sprockets.

Get nearly 99% efficiency throughout the long life of your drives

Whether your problem is transmitting fractional or extremely heavy horsepower, Morse precision Roller Chains and Stock Sprockets can help you.

Morse precision Roller Chains are noted for excellent workmanship and accuracy, resulting in long, trouble-free service life. There is positive power transmission with Morse precision Roller Chains, with *nearly 99% efficiency throughout their entire life.* Coupled with Morse Stock Sprockets, they make an excellent power transmission team; one which reduces both downtime and maintenance.

Rollers on Morse precision Roller Chains are shot peened and heat treated for maximum strength and endurance. They are held to close limits to provide even distribution of the load.

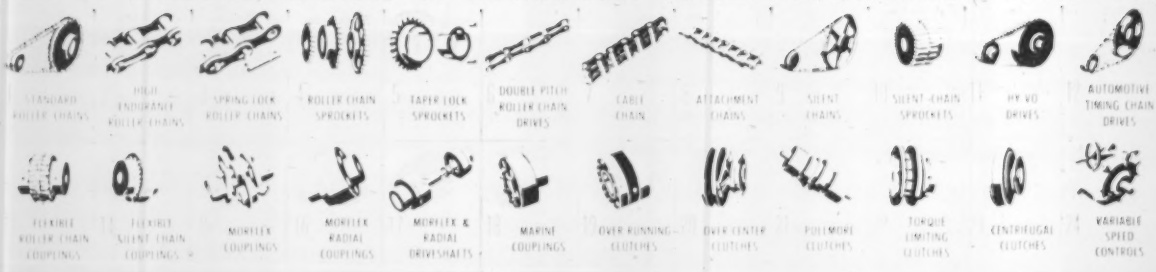
When Morse precision Roller Chains and Stock Sprockets go to work, you gain in off the-shelf service and design flexibility. Morse precision Roller Chains save space by transmitting more usable power than many other types of power transmission drives. They operate equally well on short or long centers, and mesh with sprockets on either side of the chain to drive multiple sprockets for accurate timing. You realize production economies through greater permissible center distance tolerances and greatly increased ease of assembly.

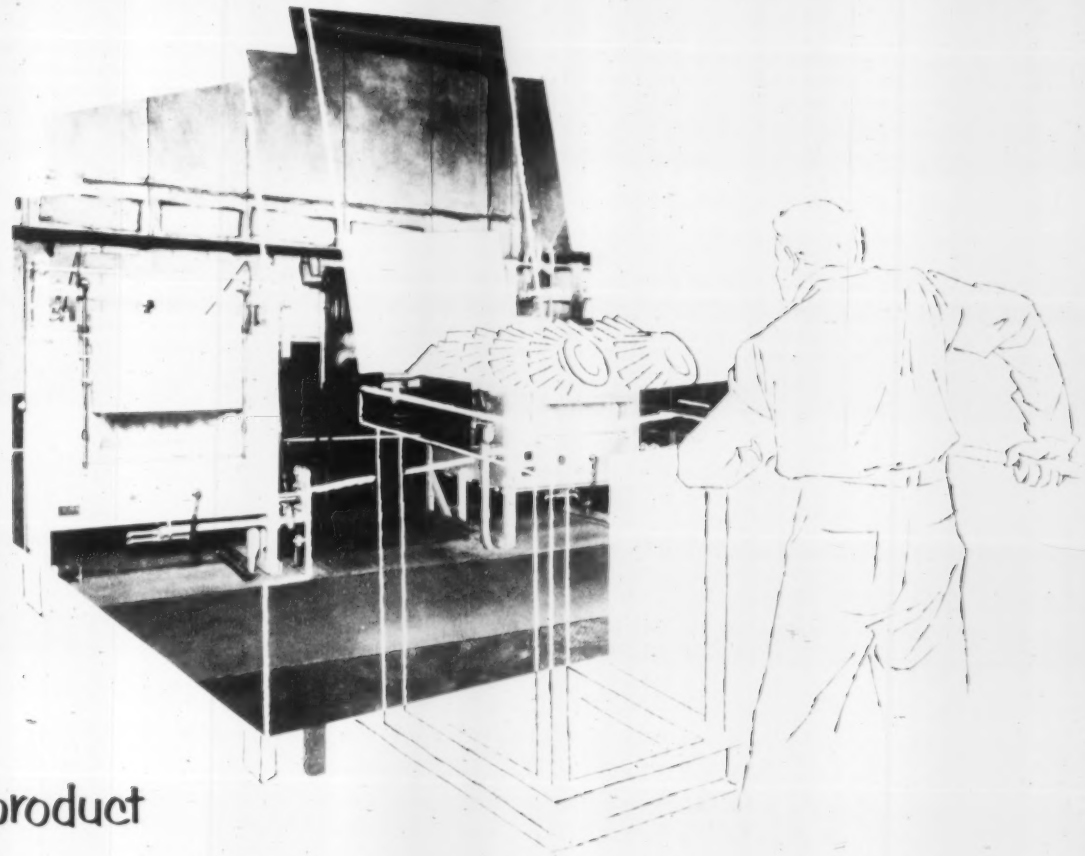
Be sure to call in your Morse sales engineer on every power transmission problem. He is a qualified power transmission specialist and can bring the latest information and specialized engineering aid to you. Write us today for further information. Morse Chain Company, 7601 Central Ave., Detroit 10, Michigan.

MORSE

MECHANICAL POWER TRANSMISSION PRODUCTS

FOR 24 REASONS, MASTERS OF MECHANICAL POWER TRANSMISSION SINCE 1893





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THE WEEKLY MAGAZINE OF METALWORKING

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Electric Furnace Co.
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Claud S. Gordon Co.
Gulf Oil Corp., Super Quench Oil
Hevi Duty Electric Co.
Holcroft & Company
E. F. Houghton & Co., Heat Treating Materials
James H. Knapp Company, Inc.
The Lakeside Steel Improvement Co.
Leeds & Northrup Co.
Lepel High Frequency Laboratories, Inc.
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Sargeant & Wilbur, Inc.
Westinghouse Electric Corp., Electronic & X Ray Div.

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That's because our tubing stocks are so large and diversified—are, in fact, the nation's largest. And because we have *a tube for every use* you can be sure of completely unbiased recommendations when you consult Ryerson specialists on tubing problems.

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STEEL

March 29, 1954

Metalworking Outlook

UAW and the Guaranteed Wage

Look for the United Auto Workers' annual wage plan to contain these proposals: Joint company-union administration of the plan; financing on a pay-as-you-go basis with a reinsurance provision; unemployment compensations to be treated as an offset which the employer may use to reduce the cost of the obligations he assumes under the guarantee plan. Significantly, UAW's Nat Weinberg, director of research and engineering, reveals those points months before the CIO union's 1955 contract negotiations open. The idea is to promote more discussion of the issue.

Inventories and Strikes

Steel buyers are thoughtfully studying steel labor prospects this summer. Inventories are way, way down now. Paradoxically, even a short steel strike in July would be more disastrous to metalworking than the long walkout in 1952. Two years ago steel stocks were high. Now that they're so low, purchasing agents are wondering, even though current odds favor a peaceful settlement.

U.S. Will Hold Off

The U. S. will hold its supplies of surplus metals off the market wherever it finds that disposal would have a "serious adverse effect" on prices. The Office of Defense Mobilization's statement is designed to allay fears that the government would release stocks of copper, lead and zinc now being delivered as a result of market guarantee contracts and similar devices used to boost production during the Korean war. The end of that conflict means the probable accumulation of surpluses of those three raw materials, plus tin, magnesium, tungsten, linseed oil and long-staple cotton.

Weldments: Doing Well

Weldment manufacturers are doing unusually well. That branch of metalworking is outpacing most others currently, and the outlook for the year is optimistic. Volume so far in 1954 is only slightly below the corresponding period a year ago. But to obtain the same volume of orders as formerly, manufacturers must quote on about twice as many inquiries. Required deliveries are also too tight.

Rat Race in Roads

The dilemma of roads continues. Bills before Congress calling for $800 million and $835 million in aid for highways are inadequate even though both of them are above the $575 million currently allotted. The total annual expenditure required to provide an adequate road system within a decade is more than $8 billion, compared with the present yearly outlay of about $5 billion.

Coming Up: Foreign Trade Policy

The President's foreign trade recommendations are due to be presented to Congress this week. They'll embody some of the Randall Commission's

The Technical Outlook p. 101 The Market Outlook p. 137

proposals, but not all. The Randall report has run into some heavy criticism, the latest stemming from a conference sponsored by Princeton's International Finance Section and Center of International Studies. The conference scores the Randall study for "its want of basic philosophy." The commission, incidentally, closed its doors last week and returned $110,000 of unused funds to the Treasury.

It Pays To Advertise

Watch for the Defense department to advertise for bids on more of its contracts from now on. Since 1950, some 90 per cent of all defense procurement has been on a negotiated basis. Congressional pressure is mounting for more advertising-bid purchasing. One articulate advocate for the shift is Rep. Paul Brown (Dem., Ga.), a member of the House Banking & Currency Committee.

How's Your Salary Plan?

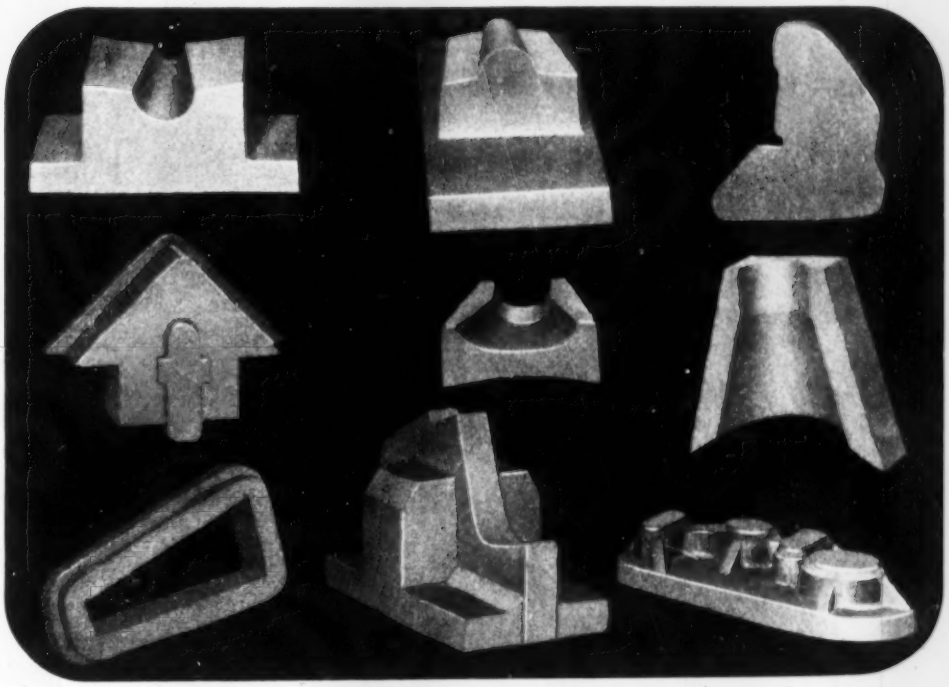
What's your executive compensation policy? James C. Olson, a partner in the management consulting firm of Booz, Allen & Hamilton, told the Controllers Institute of America that a proper salary plan should: Establish the value of each position as compared to all other salaried positions; place a proper monetary value on each position; establish for each position an appropriate salary range; provide for periodic review of individual performance to grant salary increases; and create a feeling of confidence in the fairness of pay for work done.

Straws in the Wind

Nash-Kelvinator Corp. and Hudson Motor Car Co. stockholders have approved plans to merge the two firms . . . Armco Steel Corp. will spend $33 million in 1954 to streamline operations and reduce costs . . . Declines in prices on some consumer items brought the cost-of-living index down by 0.2 per cent in the month to mid-February . . . Cheaper raw materials costs made possible price cuts on ferrosilicons, says Electro Metallurgical Co., division of Union Carbide & Carbon Corp. . . . Until the Navy and Air Force recheck their aluminum requirements and report May 15, the third round of aluminum capacity expansion will be held in abeyance . . . Steel scrap is being considered by the Chicago Mercantile Exchange as a new commodity to be traded on its floor.

This Week in Metalworking

Metalworking's profits dipped in first quarter, 1954, but not as much as sales volume (p. 57) . . . Rate of increase in unemployment slows down a bit (p. 58) . . . Signs appear of a reawakening in fastener markets (p. 59) . . . Here's a check list of how you can help minimize the effects of a recession (p. 60) . . . Bridgeport Brass takes a big step into aluminum (p. 61) . . . Traffic managers scurry as ICC approves rail rate cuts on steel shipments (p. 62) . . . Government catalog for buying of steel is well on the way (p. 63).



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of Tool and Die Making —you Buy Less Steel and Reduce Machining Costs

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Tools which could not be made by conventional methods except in sections can often be fabricated from FCC Cast-To-Shape blanks in a single piece.

In many instances performance of the tool is better than can be obtained by fabrication from bar stock or forgings.

Particulars are available through Allegheny Ludlum representatives; or write for the booklet today.

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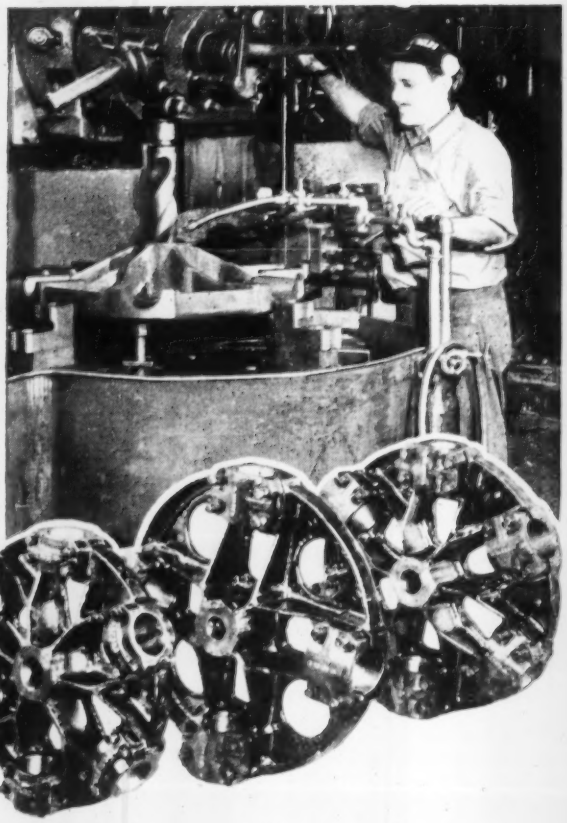

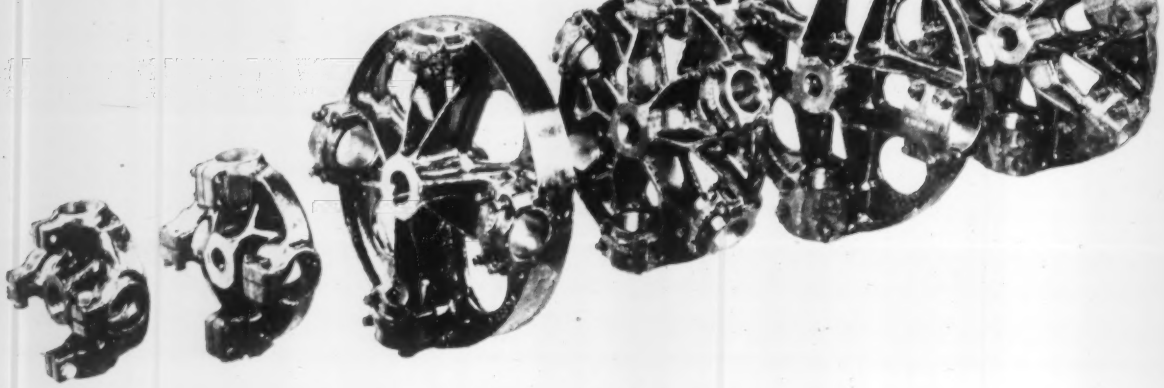

Who will be next to make better products for less money by using Ductile Iron?

Profit from the example of Metal Products Division of Koppers Company, Inc., Baltimore 3, Md. This manufacturer not only cut costs but improved performance of one of their specialties by adopting Ductile Iron hubs for "Aeromaster" industrial fans.

These propeller-type fans, ranging from 54 inches to 24 feet in diameter, are generally used in pipeline pumping stations and similar places where vibrations from nearby engines, compressors or other machinery compound the vibrations of a fan.

For the hubs, which may vary from 50 to 225 pounds in weight, good tensile and fatigue properties are obviously essential. In addition, excellent castability is needed because the heavy center portion, the heavy flange and the thin interconnecting webs of each hub vary considerably in section thickness.

So far, no Ductile Iron hub has been rejected. The manufacturer sand-blasts hub castings and then heat-treats to provide 60,000 p.s.i. minimum tensile strength and 15% elongation.

Tensile strengths in excess of 150,000 p.s.i. may be attained by other heat-treatments. Investigate how Ductile Iron can improve your products or equipment. Learn the facts about its machinability, its resistance to wear, to shock and vibration. Investigate the facts about its damping capacity.

Send us details of your prospective uses, so that we may offer a list of sources from some 100 authorized foundries now producing Ductile Iron under patent licenses. Request a list of available publications on Ductile Iron . . . mail the coupon now.

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THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

March 29, 1954

Vulnerable to Fear

Much emphasis is being placed upon the question, "Can we talk or think ourselves into a serious business recession?" In most cases, those who may be considered competent to answer have replied that while mass psychology has a definite influence upon the action of individuals, something more substantial than mere talk is required to set off an economic crisis.

While many thoughtful persons will accept this orthodox view as sound, it may be well to consider a few aspects of the situation which have received little attention. For instance, is the United States more vulnerable than other nations to the possibility of talking itself into economic trouble?

Strangely enough, the answer is "yes." At last week's meeting of the Association of National Advertisers at Hot Springs, Va., Robert M. Gray, advertising and sales promotion manager, Esso Standard Oil Co., discussed the role of psychology in influencing economic trends. Mr. Gray, who rates great credit for co-ordinating the highly successful "Future of America" campaign of the Advertising Council, points to the significant fact that in our nation we have achieved a standard of living under which 50 per cent of the purchases by individuals are for items that are not necessities.

"It is a paradox," he says, "that as our discretionary spending power has increased, the danger that we can indeed talk and think ourselves into severe economic troubles has also increased." In short, the very fact that we have available more money than ever before to spend for nonessentials makes it easier to say "no" when rumor puts fear into our minds.

Preliminary results of the Federal Reserve Board's annual study of consumer buying plans indicate that liquid assets of consumers (savings available for spending) early in 1954 had not changed appreciably from the figures of early 1953. What has changed is the disposition of the individual to spend. He is more cautious, more conservative.

In view of this and other evidence, one wonders why politicians are going to such lengths to make more money available for spending. The money is there. Plainly the greater need is a more confident willingness to spend it.

E. L. Shaner

EDITOR-IN-CHIEF

THE CONSUMERS' PLANS: In the Federal Reserve Board's annual study of consumer buying plans (p. 76), which reflects conditions of the early months of 1954, it is stated that consumers generally were found to be in a strong financial position. For instance, the

percentage of consumers who had zero liquid assets early in 1954 was 26, compared with 29 per cent early in 1953. Slightly fewer consumers had savings ranging from $1 to $199 and from $1000 to $1999 than in the previous year. The percentage of consumers who had liquid assets of from $5000 to $9999 and of $10,000 or over was the same in 1954 as in 1953. There was a slight increase in the percentage of consumers who had savings of from $200 to $499, from $500 to $999 and from $2000 to $4999 in 1954 as against 1953.

A significant feature of the study was that many consumers expressed a greater reluctance to buy in early 1954 than in early 1953. Many will buy in the last half of 1954, if at all.

A LOOK INTO LEASING: Interest is mounting rapidly in the leasing of capital equipment. Within 60 days after one company announced a new rental plan, it had 30 leasing deals for its expensive machinery signed or pending. Another company that recently has gone into leasing its equipment says the new practice is broadening its market. All but two of its contracts are with new customers—ones who previously went to used or rebuilt equipment dealers for their needs. A materials handling equipment manufacturer says that the initial response to its leasing plan "will contribute materially to our volume of business in 1954."

These reports should be impressive enough to cause equipment builders and users to examine the subject of leasing carefully. In many instances (p. 67) there are distinct advantages for lessor and lessee. Although at the present time the amount of nongovernment capital equipment in American plants that is leased rather than owned by the user probably does not exceed 5 per cent of the total, this percentage is bound to increase.

RIVALING A BIG FACTOR: A very important factor to be considered in management policy in the metalworking industry is the rate of technological progress. An alert staff of officers in a progressive company may decide to spend a considerable amount of money to modernize facilities in a certain manufacturing department. Having done this, the executives are prone to think that they have placed this department in a position where it will not require additional expenditures for capital equipment for many years—perhaps a decade.

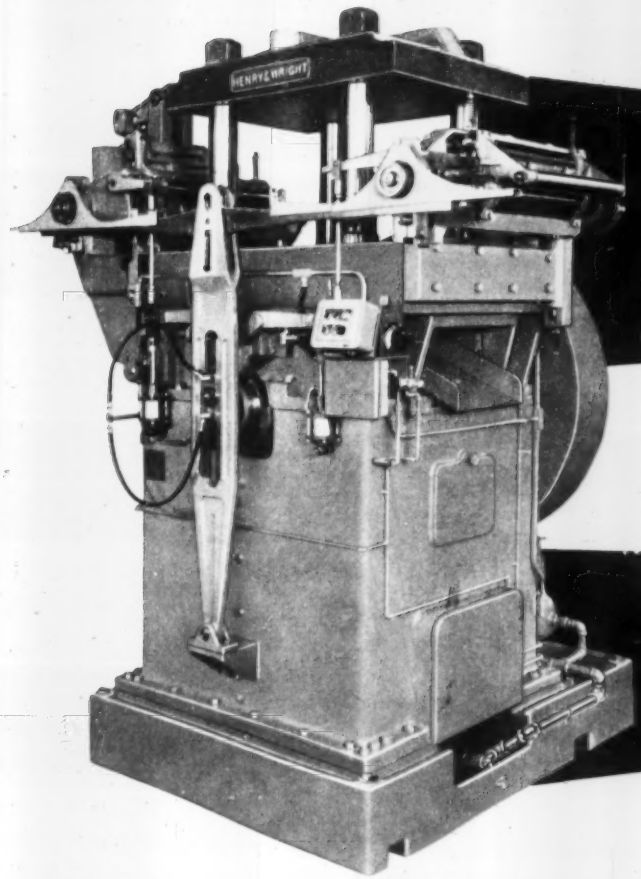
This never has been a safe assumption, and today it is more than ever subject to question. The increasing tempo of improvement in almost all manufacturing operations is establishing a much more rapid pace for survival in the metalworking field. Has your company what it takes to keep up with the procession of successful enterprises?

HOW TO SAVE MONEY: One way in which the latest improvements in the technology of the metalworking industry can be applied to the operations of your company is in connection with heat treating. Perhaps your executives have been foresighted and possibly you have heat treating equipment that is far superior to that installed in the plants of your competitors.

But unless you are outstandingly superior in your field, you will do well to study the most recent advances in heat treating methods. There are distinct opportunities (p. 102) to reduce costs appreciably without any sacrifice in quality. In fact, if your people become familiar with the most advanced practices in heat treating, they may be able to do with carbon steels and leaner alloys what earlier could be accomplished only with more costly alloy steels.

EASING 274 HEADACHES: In this issue (p. 106) J. D. Armour, chief metallurgist of the Union Drawn Steel Division of Republic Steel Corp., explains how machining tests were run on about 200 currently used types of steel—including stainless—in order to study the day-to-day problems that are encountered by the users of these steels in machining them. The tests were run on automatic screw machines to approximate the experience of the average machine tool user.

One by-product of these studies is a diagnosis of troubles encountered with tools most commonly used in connection with drilling, tapping, milling, broaching, reaming and similar operations on stainless steel. Among the things to guard against are loose spindles, dirty coolant, too much land or speed, poor chip elimination and too much chatter. The information in this article should be useful to many users of stainless steel.



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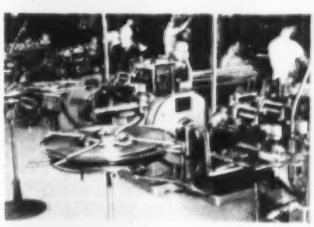
If you have to produce more in a given time — the proven answer is a Henry & Wright Dieing Machine. Here is the capacity that enables you to keep pace with sudden scheduling changes; the consistent accuracy that permits you to set and automatically meet higher standards of work quality, while reducing cost.

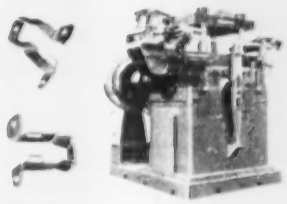
In the Henry & Wright Dieing Machine, you have a production tool designed for high speed, built to widen radically the practical application of progressive stamping and engineered to prolong the life of your dies. Outstanding in its application for light and medium gauge metals, the Dieing Machine is also demonstrating that it can achieve equally extraordinary results in stamping and forming heavy gauge parts.

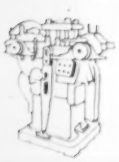
You owe it to yourself to include the Henry & Wright Dieing Machine in your plans for modernization, expansion or replacement. We welcome an opportunity to discuss its specific application to your requirements.



25 ton Henry & Wright Dieing Machines with twin die set ups produced 435 parts per minute per machine at Barber-Colman.

250 ton Henry & Wright Dieing Machine producing 54 completed hinge boxes per stroke from $\frac{5}{32}$" x 13" steel in coil form.





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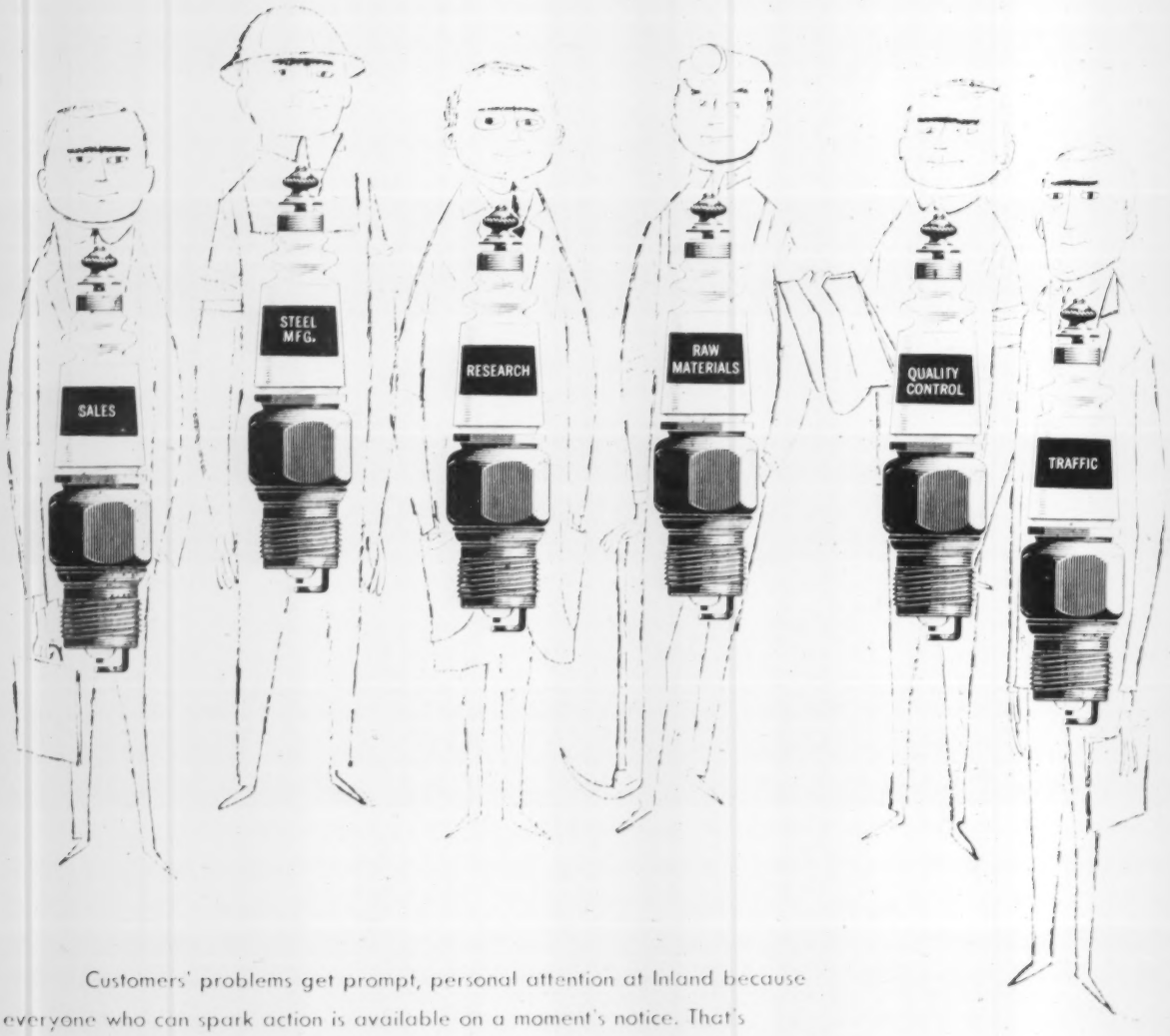

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METALWORKING'S FIRST QUARTER
Consolidated Balance Sheet

Assets	Liabilities
No Excess Profits Tax	Lower Volume
Less Overtime	Idle Capacity
Lower Materials Cost	Price Concessions
Greater Efficiency	
	NET RESULTS

PROFITS DIP,
but less than volume

METALWORKING'S after-tax profits will be down, but not as much as sales volume.

That's the general outlook for the first quarter of 1954, compared with the same period last year, according to a spot STEEL survey. There are, of course, exceptions to the general run, mostly companies that never had to pay an excess profits tax.

The Reasons—Executives list two reasons for the improved ratio of profits to sales: 1. The absence of excess profits tax. 2. The return to "more normal activities where a firm has greater control over its operations."

Pointing up the effect of the EPT elimination, the treasurer of an equipment producing firm says his financial statement will look like this: Sales down 23 per cent, gross profit down 32 per cent, but net profit will be equal to 1953. A Midwest firm says its after-tax earnings will be 14.3 per cent of sales in this quarter compared to 12.8 per cent last year.

Plus Factors—But not all boosts in profit ratio to sales can be attributed to the death of EPT. A New Jersey company says its sales will about equal those of 1953, but profits will be up "because of closer management."

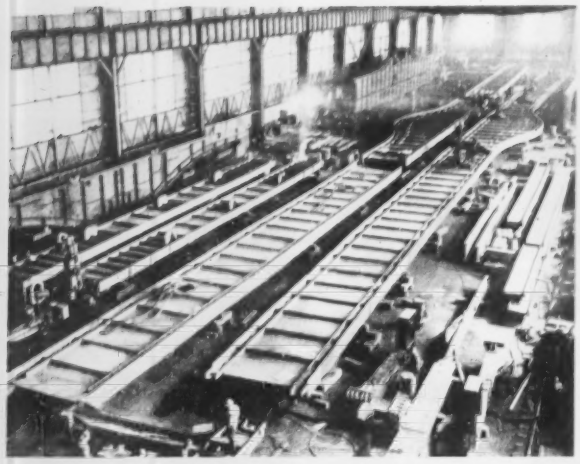
Most frequent comments for improved profit ratio given by metalworkers were these: "We've trimmed our work force and cut out overtime." "By paying more attention to purchases we've eliminated all premiums and extras on materials." "Our operations are such that we don't have to subcontract any more of our work."

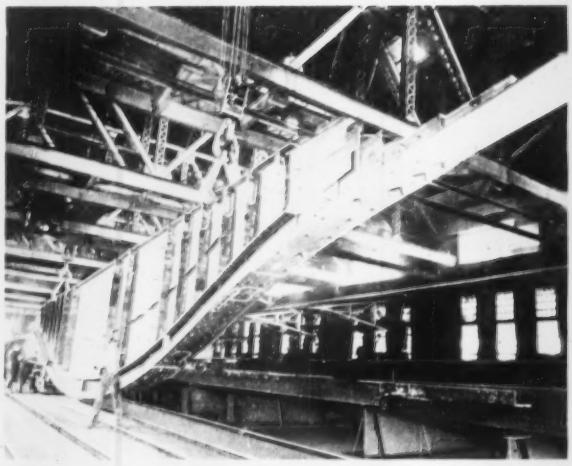
Minus Factors—Tending to push after-tax profits down as far as or farther than sales volume are idle capacity and price concessions. Lower sales volume has the severest effects on after-tax profits when an industry is heavily capitalized and thus is hardest hit when capacity is idle. And to avoid the idle capacity, that industry is most prone toward price concessions freight absorption, elimination of premiums and other devices.

For that reason, some of the more heavily capitalized industries are exceptions to the rule that after-tax profits will be down, but not as much as sales volume in the first quarter. Some steel companies, for example, in the first quarter are finding their after-tax profits down to a greater degree than in industry generally. A few industries notably aircraft find operations still are high, and both sales and profits increases are expected to show on this quarter's financial statements.

Business Picture—Over-all, this is the picture executives outlined for this quarter's activities: Sales, compared with 1953, are down from 10 to 40 per cent, with 15 to 20 per cent being the average. Net profits will vary from near the zero point to 10 per cent increases over last year. Red ink will definitely be the exception. Stacked up against the record earnings and sales of 1953, the figures are sobering. But genuine optimism was still the general tenor of the executives' comments.

Another factor in addition to general operational economies which will play an important part in the profits picture is diversification. Small companies in particular, where one or two good-sized orders can often spell the





Haunch and Fish Belly for a Brace of Bridges

Four "haunch" girders for Garden State Parkway over the Raritan river in New Jersey are being constructed by Bethlehem Steel at Pottstown, Pa. Largest weigh 95 tons

Eight of these 57-ton "fish belly" girders will help support twin bridges for New York Thruway at Montezuma, N.Y. American Bridge Division, U. S. Steel, is building them

difference between profit and loss, are diversifying. A Connecticut company estimates its first-quarter earnings will be up 20 per cent because of "exploitation of new products and increased territories and coverage."

Outlook Favorable — For the profits picture for the remainder of the year, most executives still believe the year-end statements will show less than a 10-per-cent drop in net profits. Definite new order increases in the first two weeks of March have been noted by many companies, giving more strength to the indications for a business upturn.

This outlook plus continued improvement in the ratio of profits to sales adds optimism for good profits in 1954.

Trade Balance Drops in '53

The nation's foreign trade balance in 1953 was the smallest of any postwar year, reports the Office of Business Economics, Department of Commerce. Omitting military aid, exports exceeded imports by $400 million; in 1952 the balance was about $2.3 billion.

Total exports of goods and services last year were valued at $21.3 billion, including $4.3 billion under military aid programs. Imports totaled $16.6 billion, according to department figures.

Unemployment Still Rising

Forty more major markets show added surplus of workers, but rate of increase declines

FORTY major labor market areas showed increased surpluses of labor in the mid-March survey of the Labor department's Bureau of Employment Security. Of the forty, nine moved into the substantial labor surplus category, making a total of fourteen added to this group since January. The number of major areas now in the substantial labor surplus classification is now 34. In addition, the bureau lists 46 smaller areas in the Group IV labor-surplus category.

Problem Spots—The nine major areas added to the substantial surplus category are: Charleston, W. Va.; Portland, Oreg.; Chattanooga, Tenn.; Duluth-Superior, Minn.-Wis.; Huntington-Ashland, W. Va.-Ky.; Paterson, N. J.; Racine, Wis.; San Antonio, Tex.; Wheeling-Steubenville, W. Va.-O. The five added in February were: Detroit and Battle Creek, Mich.; Toledo; South Bend, Ind.; Davenport-Rock Island-Moline, Iowa-Ill.

Job declines in a wide range of industries, rather than selected lines as was the case a few months ago, were responsible for the unemployment increase. Declining employment in major production centers during the winter affected workers in basic steel, nonferrous metals, ordnance materials, shipbuilding, electronics and electrical equipment and textiles.

But the rate of unemployment increase seems to be slackening in a substantial number of areas, particularly in centers producing aircraft and certain appliances.

Steel Pay Costs Up, Hours Down

Employment and hours of work per wage earner in the iron and steel industry were down in January, but average hourly payroll costs were up, according to American Iron & Steel Institute.

Employment was estimated at 644,900 compared with 655,800 in December and 683,800 in January, 1953. Wage earners worked an average of 35.7 hours a week compared with 37 hours in December and 40.7 hours a year ago. Hourly payroll costs of wage earners averaged $2.294 or 1.5 cents higher than in December and 7.8 cents higher than January, 1953.

Despite the decline, employment in January remained 9400 above the average in 1950, and the total January payroll of about $251 million, compared with about $264-million in December, was still higher than in any month prior to 1952.

Republic Steel

Signs of stronger ordering in fasteners lead to the question . . .

Reawakening in Fastener Markets?

Yes, some. At least the drastic downtrend in industry sales seems to have leveled off in first quarter, 1954. Inventory adjustments may be over

HAS INDUSTRY completed its inventory adjustments on fasteners?

Fastenermakers think so. And there are definite signs that they're right.

Time of Change—No one in business today needs to be told with what interest fastener manufacturers have been looking for an end to this adjustment. Dollar sales of the fastener industry have been on a bumping-downward trend since mid-1953.

For first quarter, 1953, industry dollar sales were about $128 million; for second quarter, $130 million; for third quarter, $109 million; and for fourth quarter, 1953, $103 million. First quarter, 1954, which was to have been the turning point in sales volume, turned out to be no better than fourth quarter, 1953. But here's the point—it wasn't appreciably worse either.

Signs of the Times—While many of the 300 firms in the industry report 1954 sales estimates as down anywhere from 10 to 25 per cent below 1953 sales, currently orders are coming in at fairly good rates. One firm, for example, says its farm equipment customers are again reordering after a quiet 1953, though at rates nearly one-third below those of the preadjustment period. These are apparently for current production as orders are always wanted "yesterday." This fastener firm believes the farm equipment producers are through their inventory adjustments.

Appliance customers, after some extreme flip-flops in ordering during 1953, have settled down to a fairly stable volume although again at rates reduced from those prior to mid-1953. Stovemakers are cited as an exception to that stability. Fastener manufacturers generally believe the auto firms are through their inventory corrections as far as fasteners are concerned. Ordering went from a 90-day basis to a 30-day basis during the last six months of 1953. The quicker deliveries demanded, plus the sharper pencils being found in Detroit these days, convince fastener people the automotive trade is back to its prewar normal competitive as the devil.

Timely Ordering—Of other major industry customers, aircraft business is still fairly good but inclined to change rapidly. There's still some shifting of fastener stocks from one model to another going on, it's believed. The railroads are at best holding their own with last year's volume. They're expected to get worse. Structural steel requirements are one of the bright spots in demand. Never too heavy in fastener inventory, structural fabricators have maintained a good volume of fastener ordering right along. Jobber customers are definitely finished with their inventory shake-outs. Ordering from this direction has been on a speed-up since late last year; some fastenermakers report they've had to build up their own inventories of finished goods to help meet this rush-rush demand.

Prices on smaller sizes of standard screws are weak, but prices on rivets, larger standard fasteners and specials are still stable.

These signs of increased new order activity should not be construed in any way to mean orders are as large as they were in early 1953 and before. Orders generally are smaller and more frequent. But fastener manufacturers are happy that at least the state of suspended animation among their customers seems to be passing. It's a good sign for industry generally, too, since fastener buying is quick to react to ups or downs in metalworking demand.

Manganese Recovery Beginning

The new Coxton blast furnace near Pittston, Pa., is being placed in operation on a trial run basis by its owner, Mangaslag Inc., Washington. Unless difficulties are encountered, the furnace will begin continuous operation about May 1 reclaiming manganese from basic open-hearth slag. About 500 tons of slag containing some 35 tons of manganese will be processed daily.

The furnace's raw material, a 17 to 21-per-cent manganese spiegeleisen contaminated by about 1 per cent phosphorus, will be charged into a basic lined bessemer converter and subjected to selective oxidation. The final product is to be a superior ferro-grade manganese ore containing 55 to 60 per cent manganese, less than 5 per cent iron and less than 0.1 per cent phosphorus.

What You Can Do To Stabilize the Economy

- **Avoid inventory speculation.**
- **Exploit fully potentialities of research.**
- **Improve marketing methods and sales efforts.**
- **Get your debts on a longer-term basis.**
- **Base capital outlays on the long-term view.**

CED RECOMMENDS—

Preventive Medicine for Recession

WHAT CAN BE DONE about a recession?

The Committee of Economic Development's "Defense Against Recession: Policy for Greater Economic Stability" reports how recessions can be minimized by you, by financial institutions and by the government.

The Effect—Recessions, according to CED, have sometimes been initiated by declines in inventories and have almost always been aggravated by such declines. "Some decline in business inventories is probably normal when the volume of production and sales falls off. But the extent of the decline that typically occurs in a recession is unnecessarily and uneconomically great. Overexpansion of inventories in the boom, price speculation, exaggerated pessimism and credit stringency share the blame."

Another responsibility of individual businesses to help stabilize the economy is that of exploiting the potentialities of research in the development of new products and improved production methods, says CED. New products satisfy new wants and generate demand, which must keep growing if depressions and recessions are to be avoided. Improved production methods help reduce cost and get more products to more people.

Sales Angle — A third point stressed: If sales decline, businesses should not cut selling effort and advertising budgets as they have done in the past. "They should appraise the possibilities that will exist for maintaining sales by redoubled effort in an economy where income and savings will still be large."

Commenting upon plant and equipment expenditures, CED says business should base its expenditures on a long-term view of the current state of business in the perspective of what rate of growth and degree of stability can be expected. A long-term plan should include provision for financing that is not entirely dependent upon current profits; it might well include preparations for stepping up maintenance and modernization operations when current production declines. This should tend to reduce cyclical fluctuations in investment. (For industry's plans for capital expenditures in 1954, see STEEL, Mar. 22, p. 44.)

Everybody Can Help — In its study CED lists steps available to financial institutions and the government in contributing to the stabilizing of the economy.

Financial institutions, recommends CED, should co-operate with business in getting a larger part of business debt into long-term form which is less vulnerable to recession. They should continue to extend credit on sound loans in the event that a recession occurs.

Government Tools — Highlights of measures available to the government are: Through Federal Reserve it can provide for expansion of the supply of money and credit needed by a growing economy. A budget policy should be adopted which would not try to eliminate large deficits automatically emerging in a recession but which would produce surpluses to reduce the debt when employment is above a standard high level. Unemployment compensation benefits could be raised and duration and coverage extended. Businesses should be allowed to carry back operating losses to apply against the profits of the two preceding years. Public works programs should be worked out in advance to be set in operation when needed.

Current factors tending to make the economy better able to overcome recessions than in the past include: Stronger national financial condition; lower business and farm debts, relative to assets and earnings; private debt is on a longer-term basis; consumers' assets are large; financial institutions are able to keep credit channels open to encourage expansion; unemployment compensation; social security; and farm price supports.

Caution—Two factors in applying measures to stabilize the economy are stressed by CED: 1. In the early stages of a decline, unless there is strong evidence of a serious recession, we must rely on more flexible instruments, particularly upon monetary policy. 2. Such measures as tax reductions and public works programs should be reserved for more serious situations.

FCC Asked To Reopen File

The Committee on Manufacturers Radio Use has asked the Federal Communications Commission to reinstate in full its Petition for the Establishment of a Manufacturers Radio Service. This file could be used to present new information relating to the use of radio by yard-area manufacturing companies and as a backlog of information in consideration of new requests for special frequency allocations, says CMRU.

New Worlds for Bridgeport Brass

HERMAN W. STEINKRAUS

PITTING its 89 years of copper alloy know-how against the challenge of other metals, Bridgeport Brass Co. is looking for new worlds to conquer.

Biggest step to date came last month when the Connecticut firm took over management of the big Air Force aluminum extrusion and forging plant at Adrian, Mich. Besides aluminum, the company is showing interest in titanium, magnesium and stainless steel.

Flexibility—"I think our entry into other metals over a range of time will double our business perhaps within ten years," predicts Herman W. Steinkraus, president.

"We're basically chemists and metallurgists; not being primary metal producers, we aren't limited to any one metal," says Mr. Steinkraus. Nonintegration is no handicap: it gives the company flexibility to move in promising directions, he feels.

Merger of Metals—Most significant of the company moves is the one to aluminum. The broad advance of copper and brass companies into aluminum is no longer a minor trend: Just about every major company in the field is now processing aluminum or planning to do so.

The combination of red and white metals is not new to industry. Back in 1889 the nation's oldest brass firm, Scovill Mfg. Co., rolled aluminum into commercial strip and today sells it in 2000-pound continuous coils. Revere Brass & Copper Co. is the nation's largest nonintegrated fabricator of wrought aluminum.

Wire Mills, Too—Nearly all copper wire mills now turn out aluminum to supplement or compete with copper in a growing number of applications. For example, steel-reinforced aluminum cable (ACSR) now dominates the field for power transmission lines. Even the big copper producers have not turned their backs: A subsidiary of Anaconda Mining Co. will be producing primary aluminum this year; Kennecott Copper Corp. recently completed a sizable stock investment in Kaiser Aluminum & Chemical Corp.

Since the aluminum industry patterned much of its equipment after that of brass mills, the switch isn't difficult. Essentially, only different auxiliary equipment (such as billet furnaces and quenching equipment) is needed for most extrusion, rolling, drawing and heat-treating operations. Rolling mills must be wider, though, as bulk of aluminum rolling is in wide sheet. Operating skills required to process both metals are much the same.

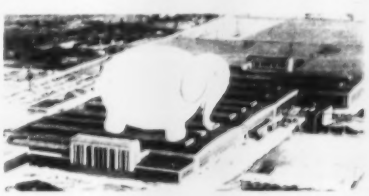
Room to Move—Aluminum has figured in Bridgeport Brass Co.'s operations since 1951; limited quantities of sheet, tube and extrusions are now being produced. The Adrian acquisition gives the company opportunity to operate on a much larger scale.

Strangely, three months before it took possession, Bridgeport management had no idea it would be running a $30-million, 800,000-square-foot plant so soon. In mid-November the company was invited to bid for the lease. On Dec. 1 it made a complete presentation of what it believed was needed. The proposal was accepted in mid-December, and management moved in Feb. 22.

Well Equipped—At Adrian are 16 extrusion presses, forging presses ranging in capacity up to 16,500 tons, and a variety of auxiliary processing equipment for working aluminum, magnesium and titanium. The company plans to "build a background of commercial operation to fulfill our primary purpose serving the Air Force." It will market rod and tube produced at Adrian through its present nationwide selling organization.

European processing ideas will

WHITE ELEPHANT CLUB



WHEN BRIDGEPORT BRASS moved into the big Air Force aluminum plant in Adrian, Mich., the *Detroit Free Press* described it as a "white elephant." In 12 years the $30-million, 800,000-square-foot plant has had as tenants Bohn Aluminum & Brass Corp., Kaiser-Frazer Corp., Gerity-Michigan Corp., Reynolds Metals Co., Bohn for a second term, and now Bridgeport Brass.

Replying to the newspaper, company president Herman W. Steinkraus pointed out that "Bridgeport is the home of P. T. Barnum he knew how to handle elephants." Plans were promptly initiated to symbolize the challenge by building a big white elephant and forming a White Elephant Club for plant personnel. The company hopes to be operating profitably by summer and will celebrate the event by painting the symbolic elephant a rosy pink.

likely figure in the company's plans.

Know How—Last year Bridgeport Brass signed a five-year contract with Vereinigte Deutsche Metallwerke, Frankfurt, Germany, to use the latter's research, design and operating experience in processing copper, brass and aluminum with the same machines.

The company holds the U. S. contract to develop the Ugine Sejournet hot extrusion process in copper, brass and aluminum. The French process, which uses molten glass as a lubricant and has proved successful in extruding steel, is now used regularly on some copper-base alloys by Bridgeport. Faster rates and lower tool costs are reported, as well as ability to extrude some alloys that can't be worked without a lubricant. Having experimented with titanium on a small scale since 1948, the company may be turning in that direction also.

Consumer Product—On the market "some time in 1954" will be a line of Bridgeport Brass cooking utensils of stainless steel and copper. Design features two thin sheets of stainless enclosing an inner sheet of copper to combine good heat transfer with tarnish resistance. Company buys stainless circles; cladding and drawing are performed in Bridgeport.

A new seamless tube mill in Bridgeport is nearing completion. Utilizing three and five-draw layouts, the mill is capable of drawing tube in 130-foot lengths. "There's nothing to prevent our making aluminum tube in the new mill if volume of brass tube doesn't hold up," says Mr. Steinkraus. Also installed recently was a Yoder electric welding machine for turning out nonferrous welded tubing at high speeds.

The Payoff—The brass firm is in good shape financially for its big challenge. Sales in 1953 spurted $15 million over 1952 to $142.6 million, and net income was up $1.3 million to $5.3 million. Even more impressive, a gain of $5.5 million was registered in cash assets, and current assets were up $12 million to slightly over $50 million. If Mr. Steinkraus' predictions are borne out, the company's sales by 1964 will approach the $300-million mark.

ICC Approves Steel Rail Rate Cuts

New rail rates in northeastern U. S. went into effect on Mar. 26. Quick approval by the Interstate Commerce Commission sends traffic managers scurrying for new schedules

IMMEDIATE transportation cost savings. That's what the railroad rate reductions effective Mar. 26 on certain steel shipments mean to steel users in northeastern U. S.

Rate reductions range up to 20 per cent and will apply on what amounted to 40 million revenue tons of traffic during 1953 in the Official Territory (bounded generally by the Mississippi, Ohio and Potomac rivers and the Atlantic ocean). Railroaders say they're carrying about 45 per cent of that traffic now; would like to increase their percentage to about 85 per cent (see STEEL, Mar. 22, p. 39).

Diversion Determinations—Quick approval of the new rates by the Interstate Commerce Commission on Mar. 22 has traffic managers of steel shipping and receiving firms burning the midnight oil. Traffic men report surveys and comparisons now being made will determine what percentage of their steel shipments will be diverted from trucks to rails. These analyses will take from a week to 10 days to complete.

One of the questions being raised in these surveys is whether rail service is good enough to meet time schedules and inplant routing even though it will be cheaper in many cases now. In some cases steel receiving firms report they'll have to make new arrangements to receive rail shipments after months of strictly truck deliveries. To be decided, too, is what steel mills will charge on products for which they quote delivered prices when the receiver stipulates truck delivery. Probable answer is that the mills will ship by truck. If that transportation cost is higher, customer will be charged the difference by the steel producer.

NEA

Precision Gyro for A. F.

Ultraprecise gyroscope can detect movement 3000 times slower than the hour hand on a watch. Developed by Minneapolis-Honeywell for the Air Force, gyro can measure angles of less than 1 36,000th degree of arc

Proof Positive—All these are relatively minor considerations, however, when stacked against the cost savings now possible by rail shipments. And it's certain that substantial tonnages will be diverted to the rails. Proof of that are protests by truckers that the new rail rates may force them out of the steel hauling business.

Truckers say they have three avenues of action open to them: One is to sit still and hope that the flexible service offered by truck deliveries will hold enough tonnage for them to operate profitably without other action; another is to adjust truck rates downward somewhere between present rates and the new rail rates; or finally to go out of business so that remaining firms can survive on the tonnage still available to truck carriers. It will take 30 to 60 days, say the truckers, before the extent of diversion away from trucks can be adequately measured. In the meantime, they've adopted a wait-and-see attitude.

Open Door—The ICC has left the door open to a complete investigation of both truck and rail rates in the Official Territory. This may bring further rate adjustments. But the ICC decision of last week settled one thing: Rail transportation of steel in northeastern U. S. is going to be cheaper.

starting last week. And for steel users, that's a step in the right direction.

Tool Shipments Up, Orders Down

Shipments of machine tools went up in February, but new orders declined, according to National Machine Tool Builders' Association.

The association's index, based on 1945-1947 figures, estimates February shipments at 321.3, compared to 319.4 in January. New orders were down to 160.2 from the previous month's 173.5. Foreign orders also dropped, from 19.1 in January to 14.8.

The new index on shipments is the highest since last October and substantially above December's 301.4. And even though new orders are down, they still are at a higher level than last November and December.

Czech Mill Equipment for Sale

Steel mill equipment for which its Czechoslovakian owners paid $16 million was ordered sold by Treasury Secretary George M. Humphrey. The equipment was ordered from an American manufacturer before the Communist coup in Czechoslovakia but was not completed until after the Reds took over. Export was prevented by the Export Control Law.

The property was manufactured by United Engineering & Foundry Co., Pittsburgh, and includes a hot strip mill, cold strip mill and cold sheet mill. Laurence B. Robbins, Foreign Assets Control, Treasury department, was appointed receiver; he has called for sealed bids on the property as a whole and on its various principal parts. Bids will be opened Apr. 28.

To Taxi on a Tether

Convair XFY-1, Navy's new vertical takeoff delta-wing fighter, is due for "Vertical taxi" tests soon. Plane will be suspended from a cable attached to nose; other cables will run to hangar floor so plane can be controlled from ground during tests

U.S. Catalog Job To Cut Steel Costs

A giant five-step program will standardize, simplify and catalog steel specifications so that U. S. procurement can conform where possible to commercial practice

THE FEDERAL government is now well along on a program to cut the costs of the steel it buys for defense and other purposes.

Top man in the project is Roger F. Hepenstal, on leave from American Can Co. to serve as assistant secretary of defense of cataloging, standardization and inspection. His task: To simplify federal specifications and to avoid paying needless extras for steel products by conforming wherever possible to commercial practice. The procedure has been to standardize specifications used by various government branches and to catalog the many physical and chemical specifications available in steel products. The work under way in the Department of Defense is embraced in these five projects:

No. 1—H-8 Handbook of Steel and Iron Wrought Products, already issued by the Department of Defense. It puts between two covers all the information brought up to date and published in various manuals of the American Iron & Steel Institute. Its purpose is to inform procurement officers as to what products and services the steel industry furnishes commercially and to avoid extra charges.

No. 2—Federal Standards No. 18, just issued by General Services Administration. Its purpose is to sum up and put in one volume all commercial tolerances to enable procurement officers to avoid needless extra charges that would be entailed in demanding closer than the commercial tolerances.

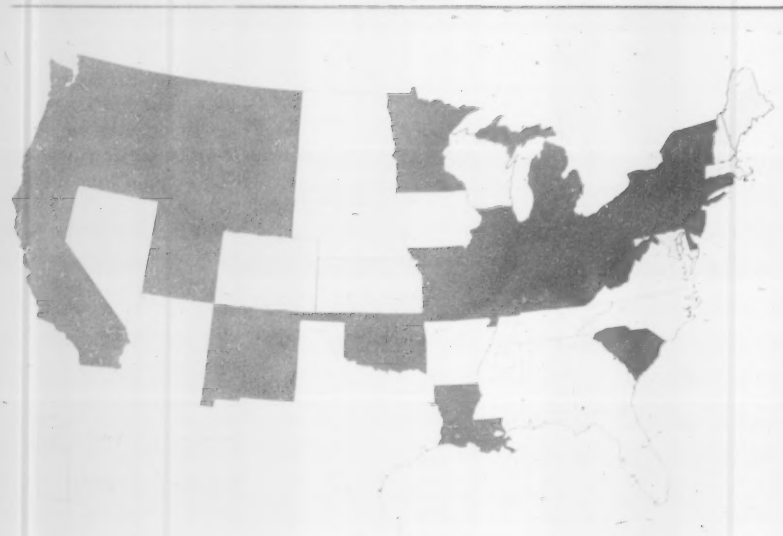
No. 3—Standard Chemical Composition, not yet numbered and probably to be issued as a federal standard GSA. It will put in one book all the commercial chemical compositions for steel products so as to enable the procurement officers to refrain from demanding what would cost extra.

No. 4—All military and federal specifications, numbering some 300 altogether, are to be reviewed. Work already has been initiated on 14, and it will take a long time to go through the list. All these military and federal specifications will be reviewed to determine whether they should and can be revised to accord with commercial practice wherever possible so as to avoid paying needless extra charges. This cannot be done in all cases as some 15 per cent of government's steel procurement involves aircraft steels, armor and other ordnance steels which cannot be procured to commercial specifications.

No. 5—Revision is in progress of Federal Specifications QQM-151, Testing and Inspection of Ferrous and Nonferrous Materials, so as to bring this book in line to as great an extent as possible with the commercial practices O.K.'d by ASTM.

The current revision being made by General Motors Corp. for Air Materiel Command in the Air Force Specifications Handbook known as DSMAH-1 does not involve any of the above work. H-1 is a cross-index of chemically equivalent specifications established by the various services. The general content of the book will not be changed appreciably since the principal object of the revision is to include aluminum and titanium.

By E. C. KREUTZBERG Washington Editor



States Act, Tighten Labor Laws As Congress Talks, Talks, Talks

WHILE Congressional committees talk, talk, talk about federal labor law changes, many states are acting to bring about a little-noted tightening in legislation affecting unions.

The force of economics is proving stronger than politics as states seeking new businesses to locate within their boundaries find that a right-to-work law is a helpful argument. Those statutes generally outlaw or sharply limit closed shops.

Right-to-work legislation is now most common in the South as southern states push to lure new employers. The trend is to locate new industries and new branch plants, other factors being equal, in states with the best labor as well as economic climate.

Take the Chicago Packer . . .

The Oklahoma City meat packing case illustrates the importance of this issue in attracting new companies. A Chicago meat packer had practically decided on a deal whereby he would locate a branch in Oklahoma City. But at the last minute he changed his mind and shifted to Texas. Reason: Texas has a right-to-work law; Oklahoma doesn't.

There now is a good range of selection for plant locations in states having right-to-work laws, and the number of states with such laws is increasing. In February the governor of Mississippi signed a law patterned after the strong Alabama law. A similar law has gone through one house in South Carolina and is expected to sail through the other and be signed by the governor. Not counting South Carolina, 15 states today have right-to-work laws: Arizona, Arkansas, Florida, Georgia, Iowa, Nebraska, Nevada, North Carolina, North Dakota, South Dakota, Tennessee, Texas, Virginia, Alabama and Mississippi.

A tendency to make these laws stronger after they once have been put in the statute book has been noted. Virginia, for example, is amending its law to include fines and other enforcement teeth.

Five Go Part Way . . .

In addition to the states with outright right-to-work laws, five others have laws which prove attractive to many employers by going at least part of the way in restricting union security. Colorado, Kansas, Maryland, Massachusetts and Wisconsin.

Still other states have bans of limited scope. Maine prohibits the closed shop but permits the union shop. New Hampshire prohibits union security agreements in establishments with five or fewer employees.

On the other hand six states including Maine had such right-to-work laws and repealed them. A number like California and New Mexico rejected state right-to-work constitutional amendments. But, under agitation from businessmen and a growing realization of the benefits from getting new industries and holding existing ones, the states which have rejected right-to-work laws could change their minds.

All Are Paramount . . .

Paramountcy of such state laws is assured by Section 13 of the Taft-Hartley Act that nothing in T-H can be used to validate union security agreements in states prohibiting them. The trend in Congress in this direction is reflected in H. R. 8211, a new bill introduced by influential Rep. Howard W. Smith (Dem., Va.) which would prevent an act of Congress from being construed as overriding similar state laws unless the act expressly provided for it to do so.

As to Taft-Hartley amendments that may be enacted at this session, nothing has been proposed to take away from the paramountcy of state right-to-work laws. As a matter of fact, decisions by the House Labor Committee in writing a bill reflect an intention of reducing the federal government's authority in the field of labor-management relations.

That's particularly true in the decision to transfer from the National Labor Relations Board to the federal courts jurisdiction over all cases involving unfair labor practices. The courts have a reputation for greater impartiality than does NLRB.

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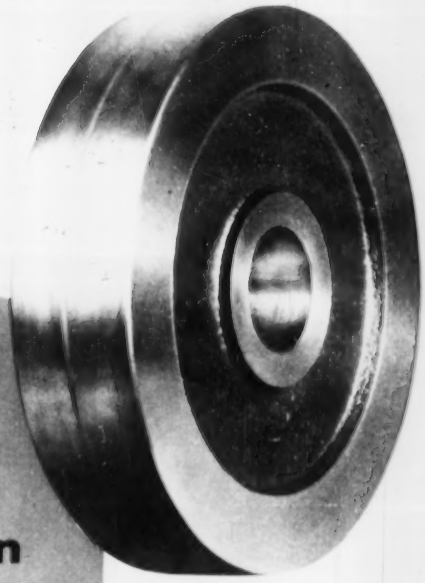
eliminates two grinding operations

machining high precision diesel engine gear blanks

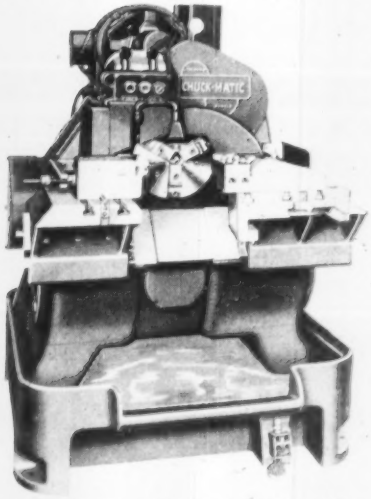


Machined on **CHUCK-MATIC** from A-4340 steel forging annealed.

1st operation: (on front side) Face hub and flange, form radius on O.D., bore and chamfer hole, turn O.D. partway.

2nd operation: (on other side) Face, finish bore and turn O.D. remainder.

ON ACME-GRIDLEY CHUCK-MATICS



Acme Gridley 12" Single Spindle CHUCK-MATIC is radically different from any other machine heretofore offered for short length primary operations such as forming, turning, drilling, straight or taper boring, facing, etc.

By switching these jobs to Chuck-Matics, Ohio Forge and Machine Corporation in Cleveland, Ohio, now machine tough forged blanks concentric within .0002"—hold tolerances which eliminate the green (or soft) grinds previously required on bore and O.D. before the teeth could be cut.

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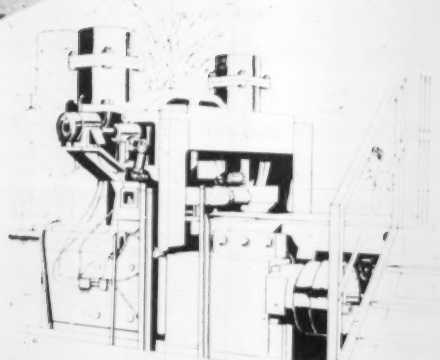
HIGH-SPEED

CONTINUOUS PICKLING LINES

BATTERY OF FOUR MESTA HIGH-SPEED CONTINUOUS PICKLING LINES WITH TRIMMERS, UPCOILERS, AND MESTA-THOMSON FLASH WELDERS



MESTA-THOMSON FLASH WELDER INSTALLED IN A MESTA HIGH-SPEED CONTINUOUS PICKLING LINE

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

PART 1

Renting . . .

For a New Lease on Business Life

NEED NEW EQUIPMENT? It's American industry's greatest need, particularly because of today's competitive economy. A sound re-equipment program can increase your efficiency and lower your costs.

It's a myth that the American industrial plant is universally well equipped. Over-age, obsolete and inefficient machinery bulks surprisingly large because of inflation, unsatisfactory government depreciation rules and, sometimes, management's inertia.

But leasing may be on way to finance your plans. This is Part I in a three-part series on leasing. Part II appears next week. Not everyone should lease, but everyone should consider the possibility because here's one means of broadening markets if you're a builder or of getting the latest equipment at minimum capital outlay if you're a user.

EQUIPMENT LEASING is something like free love—both have cost advantages over ownership or marriage; both involve relationships that may be terminated fairly easily; both are subject to legal difficulties not found in the more conventional arrangements; both are probably more talked about than practiced.

From Talk to Action—But the talk about leasing is changing to action, particularly among capital equipment manufacturers. "The practice of leasing has grown so rapidly that many tax consequences and decisions are still unknown," says Frank Griesinger, assistant treasurer of Lincoln Electric Co., Cleveland, manufacturer of welding equipment.

Why all the interest? Actually, the practice of leasing real estate, construction equipment, automobiles, over-the-road trucks and special machinery, like shoemaking, canmaking and office equipment, is old. Leasing of general capital equipment was comparatively rare until about 1939. Then, higher taxes, plus the already unrealistic Government depreciation schedules, gave it a forced-draft growth that has continued for 15 years.

Still Potent—With slightly lower taxes and the prospects for liberalized depreciation, interest in leasing is stronger than ever. That's because alert capital equipment makers see in it a device to broaden markets, and equipment users see in it a way to save on capital—both motives that have little to do with taxes or depreciation.

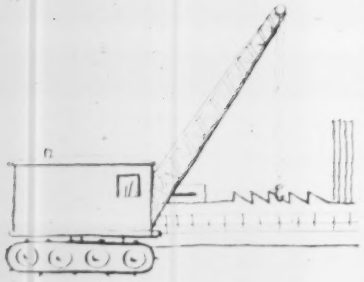
Nobody knows how much non-government capital equipment is leased, but the total is not yet high, probably less than 5 per cent of all apparatus not U. S. owned that exists in American plants. Nor will the total ever approach the amount that is owned by the user. Leasing will always be like sauce on a steak, the something extra that adds flavor to the meat of marketing, which is selling.

Why Builders Lease—Kearney & Trecker Corp., Warner & Swasey Co., Monarch Machine Tool Co., Clark Equipment Co., Yale & Towne Mfg. Co. are just a few of the companies that have introduced formal leasing plans for their equipment within the last year. Many other companies have no publicized schedule but are ready to deal that way with a customer if he wishes. Within 60 days of the announcement of one plan, the company had 30 leasing deals for its expensive machinery signed or pending.

"The move is broadening our

market," that company says. All but two of the contracts we have signed thus far are with new customers, people that formerly went to the used and rebuilt dealers for their equipment." Yale & Towne says the initial response to its leasing plan "will contribute materially to our volume of business in 1954."

Flexibility — Leasing also offers greater flexibility to a manufacturer's program. Some customers who have the money to buy prefer to lease because they can use their



Contractors, realtors commonly lease

capital more advantageously elsewhere. A large retailer who owns 100 lift trucks is considering leasing all or part of them in the future, even though his company obviously has or can easily get the funds for outright purchase.

Stability — Leasing also offers greater stability of income to a capital equipment maker, a marked advantage to that feast-or-famine industry. Take the hypothetical case of a manufacturer who has leased enough equipment to bring him a rental income of $100,000 in 1953. His production of new equipment in 1954 declines 10 per cent, the average for his industry, but his rental income holds at the same level because of the machinery he leased in better years.

From a single lease, a lessor probably makes no more profit than on a sale, but his income is spread out more from a lease. And leasing can put him in a better cash position during slumps, too. That can result in a tax advantage, likewise, because in periods of economic decline corporate taxes tend to drop.

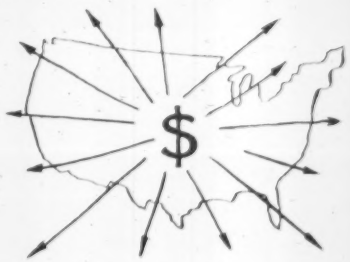
Side Benefits—The lessor can count on some side benefits, too. His equipment, sitting in the lessee's plant gives him a natural entree to the company—important when he has a product to sell that is used by or in the machine or has accessories to sell for the equipment.

Of all the advantages for a lessor, the most important one is to broaden markets. That possibility exists even if the capital equipment is relatively inexpensive. Lincoln Electric, for example, is studying the situation, although the average cost of its welding apparatus is only about $500.

Why the User Leases—The major reason why a user considers leasing involves capital. Either he can't get the money to buy the equipment or he can use the money more profitably in another way. The retailer mentioned earlier prefers leasing because he has a more profitable alternate use of funds. Dependent upon rapid turnover of capital for its profits, the company finds it advantageous to tie up as little capital as possible in its capital equipment.

This alternate use of funds involves some highly technical accounting problems. One of the best discussions of the matter can be found in *The Lease as a Financing and Selling Device*, published in Ann Arbor, Mich., by the University of Michigan's Bureau of Business Research (price $2.50).

The Tax Angle—Until now, the biggest argument for leasing has been the tax shelter it affords the lessee. Bonafide rent is fully deductible as a business expense. A



Renting broadens equipment markets

machine which the Internal Revenue Service permits to be depreciated over a period of 20 years may be "written off" from the lessee's standpoint during the period the equipment is leased in, say, seven years.

Although the tax angle undoubtedly has spurred leasing, the situation is unfortunate. Emphasis on taxes has obscured other more important advantages. Now that the excess profits tax is gone and

MAPI Looks at Leasing

IS LEASING just a current fad that will eventually fade like the rumble seat in autos?"

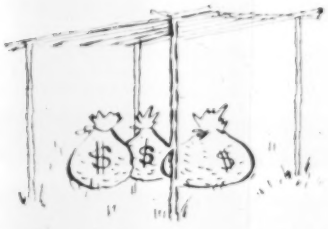
Evidence that leasing is a serious and legitimate marketing device can be found from the fact that Council for Technological Advancement, an affiliate of Machinery & Allied Products Institute, has just published a comprehensive study of the matter. CTA was moved to the action because "there is an active and increasing interest in the possibilities of leasing in many equipment fields." It points to "the growing number of leasing plans" as an indication of active and increasing interest.

The continuing study of leasing by MAPI and CTA is based on the premise that "possibilities of leasing industrial equipment exist for some companies and some products and that in those cases leasing can contribute to a more rapid rotation of capital goods and to an earlier use of new developments." CTA sees leasing as one means to "counter the ill effect of periods of reduced demand."

For details on the 20-page CTA study, check with that organization at 120 S. LaSalle St., Chicago, 3.

depreciation rules may be liberalized, the presumed tax advantage will not be so attractive. Some companies may decide against leasing because they think tax shelter the only important factor.

The tax angle also has led to ambiguous Internal Revenue Service rulings on when a lease is a



Tax shelter: Spur to leasing

bonafide rental agreement or merely a conditional sale. If a lease is a conditional sale, rent is not deductible as a business expense. The tax ambiguity "is the greatest single deterrent to leasing today," says one expert.

Other Advantages — Additional benefits to the lessee include: He avoids the danger of exceptional obsolescence; he can get newer, better equipment into his plant; he can use machinery on a test basis or for a short-run job; he can let the lessor assume the headache of service and maintenance.

Lincoln Electric's Mr. Griesinger also points out that "some financial men feel that rental payments are questioned to a lesser degree by renegotiating officers than capital asset purchases made especially for government contracts, with resulting depreciation deductions."

Leasing is most advantageous to both the equipment builder and user: When the machinery requires close and continuing co-operation between the two because of unusual service or maintenance requirements, such as with electronic equipment; when there's an expendable product used in connection with the equipment that the lessor sells, such as steel strapping or welding electrodes; and when the equipment is expensive and the user, such as a retailer or a volume producer, depends upon frequent turnover of his capital for profit.

WHY LEASE?

The Advantages

TO THE BUILDER (LESSOR)

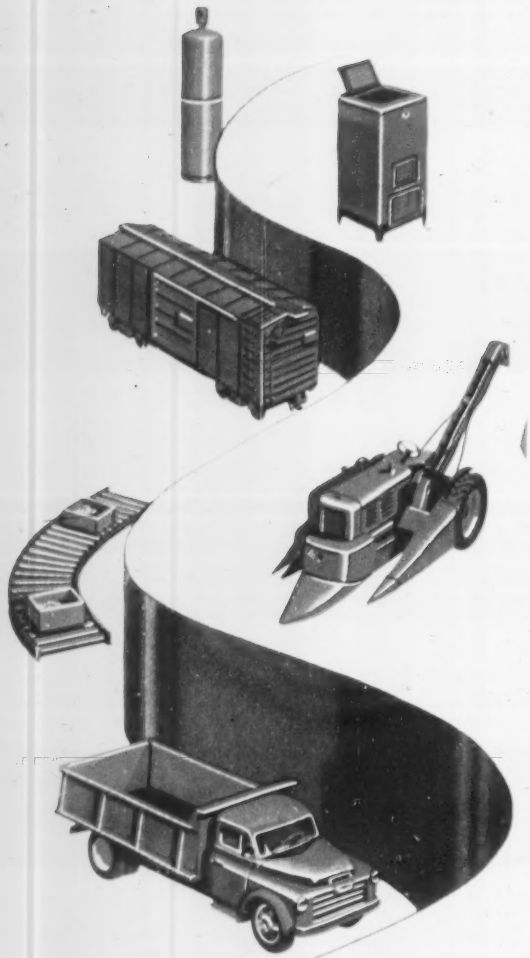
- It broadens markets by permitting small companies to use your equipment.
- It gives flexibility to your marketing program.
- It offers greater stability of income.
- It gives you tax advantages resulting from greater income stability.
- It provides an entree into the lessee's plant to sell a product used with the equipment.

TO THE USER (LESSEE)

- It permits you to modernize even if you have little capital.
- It permits you to use capital for alternate and more profitable purposes.
- It gives you newer and better equipment.
- It enables you to deduct bonafide rent as a full business expense.
- It allows you to avoid the danger of exceptional obsolescence.
- It can relieve you from the burden of service and maintenance.

TO BOTH BUILDER AND USER

- It permits closer co-operation in unusually severe service, maintenance or technical problems.
- It permits production use of experimental models at minimum cost to user and maximum benefit to the builder.



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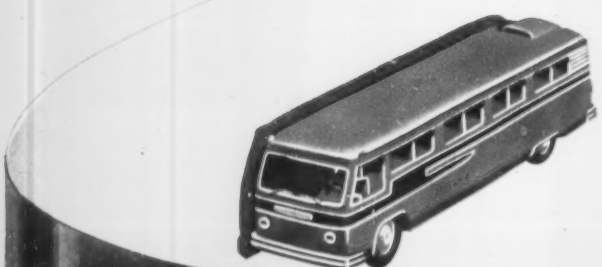

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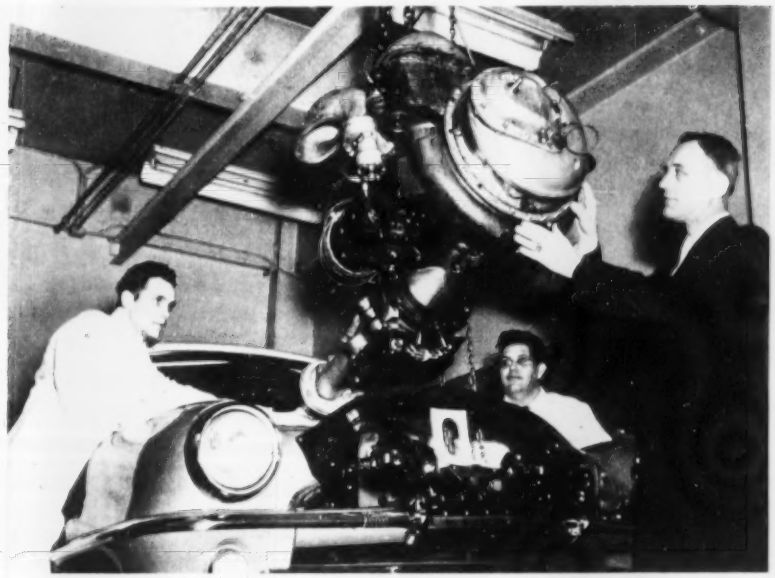

Far sooner than the public suspected . . .

Chrysler Develops a Turbine for Plymouths, but Problems Remain

DETROIT

"A GAS TURBINE engine capable of operating a current model automobile in city or highway traffic has been developed by Chrysler Corp."

That statement, without a single superlative, ranks as one of the most significant declarations to come from an automaker in years. Behind it are a few men with a limited budget who have accomplished the master anomaly of our time—a turbine-powered Plymouth. And while Chrysler is the first to point out that many questions must yet be answered before there will be a turbine in your car, the fundamental turbine design problem appears closer to solution than many had realized.

Surmounted — Less than two months ago this column pointed out some of the major obstacles to be overcome (see p. 72). Two of the most critical were poor fuel economy and hazardous exhaust gas temperatures. Chrysler's engineering and research director, Jim Zeder, believes both of these problems have been solved through a new heat exchanger. Known as a regenerator, this unit not only cools exhaust gases through heat transfer to gases being inducted, but resultant heating of the incoming gases conserves fuel otherwise required to do the job.

That essentially is the idea of the regenerator. Although the principle is not new, heat exchangers of the efficiency and capacity needed would hitherto have been too large to install in a passenger car. This unit fits comfortably under the Plymouth hood.

Top Secret — So well does the unit do its job that exhaust gases are actually cooler than those emitted by a conventional reciprocating engine at the tail pipe, and in the process fuel economy becomes competitive with current automobiles. As to how Chrysler turned the trick, this little masterpiece is the secret of the whole deal and Chrysler would like it to remain that way.

The trouble is of course that it won't. Men have a habit of transferring from one auto company to another for a price. Even if secrets weren't pollinated, you may rest assured that Ford and General Motors, who are working on the same problem, wouldn't be long in coming up with their solutions.

Nine Years — The test runs of the turbine-Plymouth were only the latest stage in more than nine years' work by Chrysler engineers. Under the direction of George J. Huebner Jr., the turbine developed is 200 pounds lighter than a reciprocating engine of comparable 160-horsepower performance and contains less than one-fifth as many major moving parts. The turbine unit, together with its set of reduction gears, is only 32 inches long, 33 inches wide and 28 inches high.

Conformity — "It is relatively simple to design much more horsepower into the turbine engine whenever it is desired," Mr. Huebner said. "The problem is to design a turbine which will conform to the requirements of the automobile."

Auto, Truck Output

U. S. and Canada

	1954	1953
January	594,789	614,000
February	573,821	628,017
March		752,474
April		782,453
May		685,390
June		743,206
July		757,595
August		611,152
September		605,228
October		651,153
November		457,852
December		529,588
Total		7,818,108

Week Ended	1954	1953
Feb. 20	148,257	161,860
Feb. 27	145,980	167,779
Mar. 6	139,263	158,825
Mar. 13	143,478	165,762
Mar. 20	154,865	169,925
Mar. 27	158,000*	181,749

Source: Ward's Automotive Reports. *Estimated by STEEL.

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HOW CHRYSLER ANSWERS THE TURBINE-SPOOFERS

The Argument	Chrysler's Answer
Fuel consumption is high, especially at part throttle.	The Chrysler turbine now gives mileage comparable to present production automobiles.
Space requirements appear large.	The Chrysler turbine fits into the Plymouth engine compartment.
Large reduction gear ratio would be required.	This is met through a double reduction drive gear setup satisfactorily.
Automotive power requirements are too low to show the turbine to its best advantage.	This turbine produces 120 horsepower comparable to similar light car engines, yields torque equal to a 160-hp engine.
Control and limiting devices must be developed to insure safe operation.	Still a car loaded with instruments and driven by experts, Chrysler engineers see no insurmountable problem in controls development for the average driver.
Separate device to produce braking torque might be required.	Better brakes will be required, either through increasing the capacity of present types, going to disc brakes or development of a magnetic type. This can be done.
Silencing might present a difficult problem.	Now almost at acceptable levels, further silencing of intake air is required and can be accomplished.
Lower first cost is questionable.	It still is. The major problem in turbine development is suitable precision manufacturing techniques for volume production and reduction in material costs.
Lower maintenance cost is doubtful.	It still is. Although there are less than one-fifth the number of moving parts, abrasive particles in the tremendous volume of air handled could make maintenance a problem. This will await suitable tests for an answer.

ner says, "but our real challenge was to design a unit in the horsepower ranges common to most cars used in everyday driving."

Major components of the Chrysler gas turbine are its air compressor unit with the first-stage turbine which drives the compressor and furnishes power for the accessories; the regenerator, which recovers heat from the exhaust gas to warm up incoming fresh air; the burner or combustion chamber; and a second-stage turbine which transmits power through a set of reduction gears to the differential and rear wheels.

Fuel—In proving ground tests, the engine burned straight-run gasoline carried in a standard 17-gallon Plymouth fuel tank. However, it will run on such mundane combustibles as kerosene and fuel oil. The turbine's surging power is inherently vibration-free because combustion is continuous and its moving parts rotate smoothly on ball or roller bearings. Air cooled, the only approximation of a radiator on the engine is a finned cooling tube for the engine oil mounted in the intake passage. The electrical system consists of a storage battery, starter-generator, coil, breaker and a single spark plug used for starting.

But two big obstacles remain to be overcome—manufacturing cost and maintenance cost. And Jim Zeder himself points out that "whether we shall ultimately see commercial production of gas turbines for passenger cars depends on the long-range solution of many complex metallurgical and manufacturing problems. There is no telling at this time how long it will take to solve these problems."

Troubles—Involved metallurgically are alloys containing molybdenum, cobalt, tungsten and chromium. Not only are these materials prohibitively expensive for mass production at the present time, but many of these materials now go to the military, precluding anything more than experimental work in the automotive field.

And in production itself new problems in close tolerances arise. The second-stage Chrysler turbine wheel was balanced on a machine which detects bearing vibrations as slight as 25 millionths of an inch, a feat which would have to be duplicated cheaply and quickly on the line. And not only do the high rotational speeds make precision balancing imperative, but parts subject to extreme stress loading will have to be made and suitably inspected quickly.

Enter, Driver—Dovetailing in with metallurgical and production problems is the consideration of a better product for the customer. Turbines cannot be produced that will be endlessly kicking their buckets.

But in a sense it may be said that the basic engineering problem is now solved. The regenerator developed by Chrysler is significant because it solves two major problems permitting the turbine to be installed in a conventional passenger car without adding a major cost penalty to the turbine itself. Now it is up to manufacturing and metallurgy to take over.

for SPEED QUEEN

Here's Why ...

Exacting distribution of weight, complexity of shape, corrosion resistance—these are the required properties obtained at low cost by designing this part to be ZINC Die Cast. It is the balance ring in the pictured Speed Queen automatic washer.

Only simple trimming operations have been performed on this part by the die caster—the balancing nibs are integrally cast around the periphery of the ring, and the holes and slots (for easy assembly on the bowl-shaped spin tub) are cored in the die casting operation. The weight (16 lbs.) is thus distributed properly to achieve perfect balance of the tub for quiet, vibrationless operation at high speed. And the ZINC alloy resists the attack of moisture and detergents with which the ring comes in contact in service.

This metal and method of production is solving more and more specific physical and economic problems in more and more product designs each day. Ask us—or any die casting company—for a copy of our new booklet "The End Uses of Zinc Die Castings" which has 48 pages of successful ZINC Die Casting applications.

ZINC IS FREELY AVAILABLE

The American Zinc Institute has issued a new folder which gives the facts on why "zinc supplies will continue to be sufficient to meet both near and long range requirements". Ask us for a copy.

The New Jersey Zinc Company
160 Front St., New York 38, N. Y.

ZINC
FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are based on

HORSE HEAD SPECIAL (99.99+% Uniform Quality) ZINC

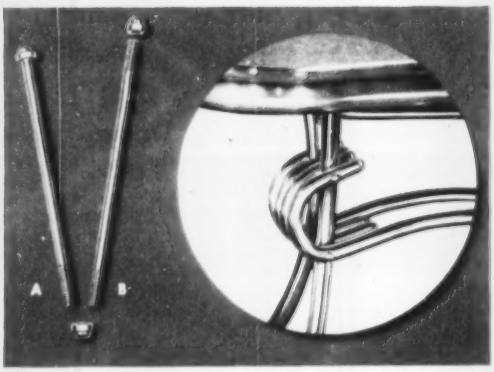
RB&W cold-forming pays off again

Virtue Brothers of Los Angeles sells a lot of these chrome dinette sets. They're good-looking, well-made, easy to keep looking like new.

However, Virtue Brothers believed assembly costs were running high. So they listened hard when an RB&W "fastener engineer" told them RB&W could cut by one-third their cost of buying and installing the steel studs with acorn nuts which hold the table legs together (see inset below).

And we did. By cold-forming an acorn head at one end of the 6-inch stud, RB&W eliminated one of the two separate nuts Virtue had been using. This halved assembly costs, as well as nut inventory. RB&W's cold-formed unit plus assembly runs $27.15 a thousand as against former costs of $41.00 a thousand — which works out to more than a pretty penny saved on a production-scale operation.

What an RB&W man did for Virtue Brothers, he can do for you. Because we make all kinds of fasteners, we're always able to recommend and supply the right ones for all your needs. Write RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, N.Y.



CUSTOMER'S REWARD was a one-third cost reduction when RB&W designed a cold-formed two-piece fastener (A) to replace the three-piece unit (B) formerly employed to secure table legs (right). 39

RB&W

109 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

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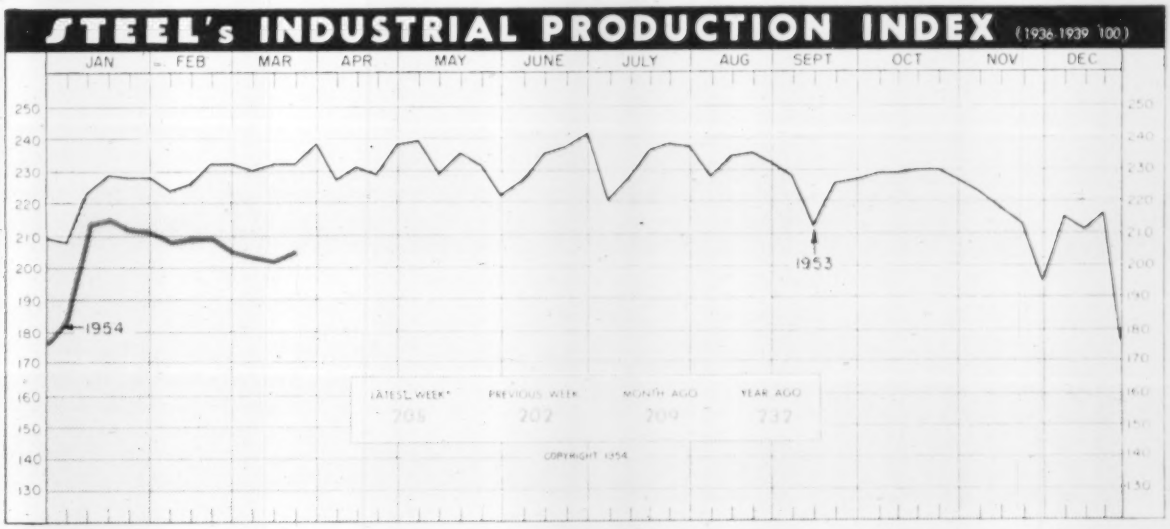


Economy Slipping? Not if Automakers Can Help It

IF SOMETHING IS WRONG with the nation's economy, either nobody has told the automakers, or the wizards of motordom have extreme confidence in the resiliency of that economy. In either case, 144,240 cars and trucks rolled off U. S. assembly lines in the week ended Mar. 20 and set a weekly high mark for the year. That is about 9 per cent above production in the preceding week and only 6 per cent below the similar week of peak 1953, says *Ward's Automotive Reports*.

With the spring splurge setting in, it is fairly certain that this quarter will go down as the third-best first quarter in the history of the industry, exceeded only by 1953 and 1951. *Ward's* estimates that by Mar. 31, about 1,416,000 automobiles will have rolled off the lines so far this year. Compare that with 1,519,895 in first quarter, 1953, and 1,610,751 in first quarter, 1951, and you get an idea of the optimism pervading automakers.

Autos Shove Index Up . . .

Bolstered by this upsurge in auto production, STEEL's industrial production index for the week ended Mar. 20 climbed 3 points to 205 per cent of the 1936-1939 average. This is the first upward trend since the 1-point increase in the second week of February. It is the first significant increase since the rebound in the first half of January. It is still too early to predict a steady climb in the index, but with heavy auto production scheduled for spring selling, it's a safe bet that it will at least hold firm for a while.

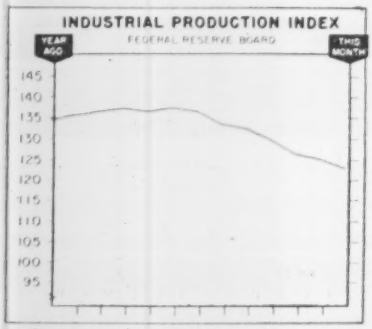
Another factor in the firming of the trend is the continued high level of electricity output as compared with a year ago. Even though the increase from year-ago levels is not as great as earlier in the year, this industry is still one of the strong segments of the American economy.

Decline No. 5 for Steel . . .

However, still lagging behind previous levels is steel production, which last week was pegged at about 67 per cent of capacity, or about 1,585,000 net tons of ingots and steel for castings, according to American Iron & Steel Institute. That was down from the previous week's rate by about 1 percentage point. A year ago, the rate was 103.1 per cent of capacity. That represents the fifth consecutive week of declining operations and just about kills all hope that March would be the turning point in the industry. However, scattered reports indicate that some producers are reaching the bottom of semifinished stocks and will soon have to begin making steel again in order to roll finished products. Indications are that orders for those products are gradually picking up, which raises the hope that the end of the inventory adjustment may be in sight.

Words from the Wise . . .

In any case, optimism is still the key word in industry. Allegheny Ludlum Steel Corp. officials last week said they expect the adjustment to run its course in the March quarter. Republic Steel Corp. Chairman T. M. Girdler and President C. M. White told the company's shareholders they believe business will increase as the year goes by and as steel inventories in the hands of fabricators are reduced. Armco Steel Corp. Chairman Charles R. Hook and President

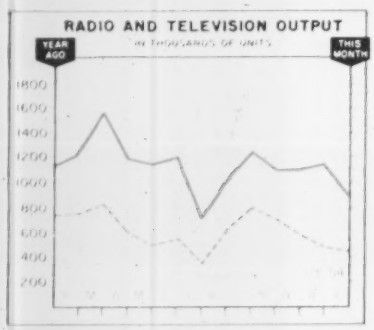


Industrial Production Index

1947-1949 = 100

	Total Production		Primary Metals		Metal Fabricating	
	1954	1953	1954	1953	1954	1953
Jan.	125	134	110	135	154	168
Feb.	123	134	107	137	149	168
Mar.		135		136		168
Apr.		136		136		169
May		137		139		169
June		136		137		168
July		137		136		171
Aug.		136		137		171
Sept.		133		130		166
Oct.		132		128		165
Nov.		129		122		159
Dec.		126		113		156
Avg.		134		132		167

Federal Reserve Board

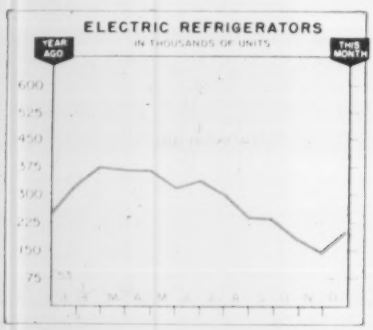


Radio and Television Output

Thousands of Units

	Radio		Television	
	1954	1953	1954	1953
Jan.	872	1,003	421	719
Feb.		1,192		731
Mar.		1,349		810
Apr.		1,159		585
May		1,109		482
June		1,161		524
July		674		316
Aug.		992		604
Sept.		1,217		770
Oct.		1,052		690
Nov.		1,066		560
Dec.		1,101		450
Total		13,368		7,214

Radio-Electronics-Television Mfrs. Assn.

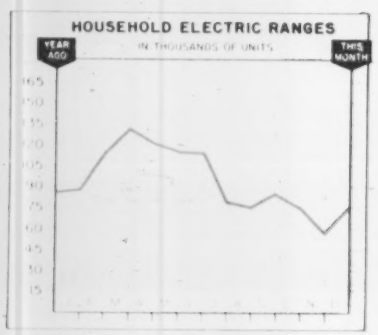


Electric Refrigerators

Total Factory Sales—Units

	1953	1952	1951
Jan.	323,186	260,259	465,603
Feb.	377,605	229,838	403,035
Mar.	368,498	276,972	558,503
Apr.	366,951	225,994	409,887
May	317,667	217,017	389,722
June	343,114	324,886	261,298
July	298,838	333,877	163,922
Aug.	232,981	240,224	165,309
Sept.	231,224	230,111	193,929
Oct.	179,749	207,066	191,519
Nov.	139,563	256,550	147,394
Dec.	197,102	248,586	196,403
Total	3,378,478	3,001,434	3,465,824

National Electrical Mfrs. Assn.



Household Electric Ranges

Total Factory Sales—Units

	1953	1952	1951
Jan.	88,145	79,982	130,316
Feb.	114,165	63,063	121,586
Mar.	130,788	93,225	159,865
Apr.	118,999	69,140	118,823
May	114,404	68,117	106,685
June	113,086	86,847	106,589
July	77,836	83,465	60,530
Aug.	74,326	71,863	64,042
Sept.	84,481	62,404	93,551
Oct.	73,122	63,145	109,963
Nov.	56,748	72,982	101,476
Dec.	75,820	84,630	72,110
Total	1,119,520	901,860	1,214,645

National Electrical Mfrs. Assn.

Charts Copyright 1954 STEEL

Issue Dates on other FACTS and FIGURES Published by STEEL

Construction	Feb. 22	Gears	Feb. 15	Ranges, Gas	Feb. 22
Durable Goods	Feb. 22	Gray Iron Castings	Mar. 15	Steel Castings	Mar. 15
Employ., Metalwk.	Feb. 22	Ironers	Feb. 15	Steel Forgings	Mar. 8
Employ., Steel	Mar. 8	Machine Tools	Mar. 8	Steel Shipments	Jan. 11
Fab. Struc. Steel	Mar. 1	Malleable Castings	Mar. 15	Vacuum Cleaners	Mar. 8
Foundry Equip.	Mar. 1	Prices, Consumer	Feb. 22	Wages, Metalwk.	Mar. 1
Freight Cars	Feb. 22	Prices, Wholesale	Mar. 1	Washers	Feb. 15
Furnaces, Indus.	Feb. 8	Pumps	Mar. 15	Water Heaters	Feb. 22

W. W. Sebald told Armco's shareholders that they believe the adjustment will be mild this year and "there will be a good demand for steel in 1954." And in another part of the metalworking industry, Reynolds Metals Co. officials report demand for most aluminum products has looked better recently.

More Middle-of-Road Talk . . .

In Washington, Treasury Secretary George Humphrey told the Senate Appropriations Subcommittee that, while he is not "looking for a sudden or immediate turn in the economy," he thinks it is "remarkable" that the economy has not dipped farther than it has. The unemployment figures of over 3.6 million put forth by the most pessimistic government reports are still not very high, he thinks. Mr. Humphrey pointed to new signs of activity in the depressed farm equipment industry.

While it is hard to tell those 3.6 million unemployed persons there is no depression, it still remains that only 5.7 per cent of the total work force of about 62.6 million is not working. Reports from the Labor department indicate a slowdown in the rate of unemployment. In the week ended Mar. 13, new claims for unemployment compensation dipped to 310,600, off 8200 from the previous week.

It's Good if You're Working . . .

For those who are working, things still look pretty good. In the iron and steel industry, the average hourly wage in January was $2.294, or 1.5 cents higher than in December, reports American Iron & Steel Institute. The increased hourly pay helped offset the reduced work hours, down to 35.7 hours a week compared with 37 hours in December. Total employment in the industry in January was 644,900, down from 683,800 in December.

The Reluctant Consumer . . .

Federal Reserve Board reports that consumers are going to be more reluctant to part with that money this year than last. In its ninth annual survey of consumer

BAROMETERS OF BUSINESS

	LATEST PERIOD	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,616	1,652	2,288
Electric Power Distributed (million kwhr)	8,572	8,519	8,078
Bitum. Coal Output (daily av.—1000 tons)	1,159	1,050	1,430
Petroleum Production (daily av.—1000 bbls)	6,490[1]	6,458	6,489
Construction Volume (ENR—millions)	$215.4	$245.5	$200.2
Automobile, Truck Output (Ward's—units)	154,405	143,478	169,923
TRADE			
Freight Car Loadings (unit—1000 cars)	612[1]	610	701
Business Failures (Dun & Bradstreet, no.)	243	229	160
Currency in Circulation (millions)[3]	$29,769	$29,870	$29,708
Dept. Store Sales (changes from year ago)[4]	−8%	11%	+11%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$20,223	$16,973	$19,452
Federal Gross Debt (billions)	$274.7	$274.7	$265.2
Bond Volume, NYSE (millions)	$16.5	$18.2	$15.9
Stocks Sales, NYSE (thousands of shares)	8,934	9,197	9,552
Loans and Investments (billions)[4]	$79.7	$79.5	$77.8
U. S. Gov't Obligations Held (billions)[4]	$22.3	$32.3	$31.3
PRICES			
STEEL's Finished Steel Price Index[5]	189.74	189.74	181.31
STEEL's Nonferrous Metal Price Index[6]	209.0	206.7	225.1
All Commodities[7]	110.6	110.6	110.0
Commodities Other Than Farm & Foods[7]	114.3	114.4	113.4

[1]Dates on request. [2]Preliminary. [3]Weekly capacities, net tons: 1954, 2,384,549; 1953, 2,254,450. [4]Federal Reserve Board. [5]Member banks, Federal Reserve System. [6]1935-1939=100. [7]1926-1929=100. [8]Bureau of Labor Statistics Index, 1947-1949=100.

finances, the board found that the public will buy fewer new cars, houses, furniture and appliances in 1954 because they are less confident about their financial prospects this year.

Again, apparently nobody has told the businessman about this, because, in a survey of 5000 companies taken during February and March, Commerce department and Securities & Exchange Commission report that those firms believe their sales "on the whole" will be about as high as 1953 levels.

To Be or Not To Be . . .

But some of those firms may not be around to verify that opinion if the present rate of business failures continues. Dun & Bradstreet Inc. reports that the 926 failures in February was the highest figure for any postwar month. That figure is still 23 per cent below the prewar level of February, 1939.

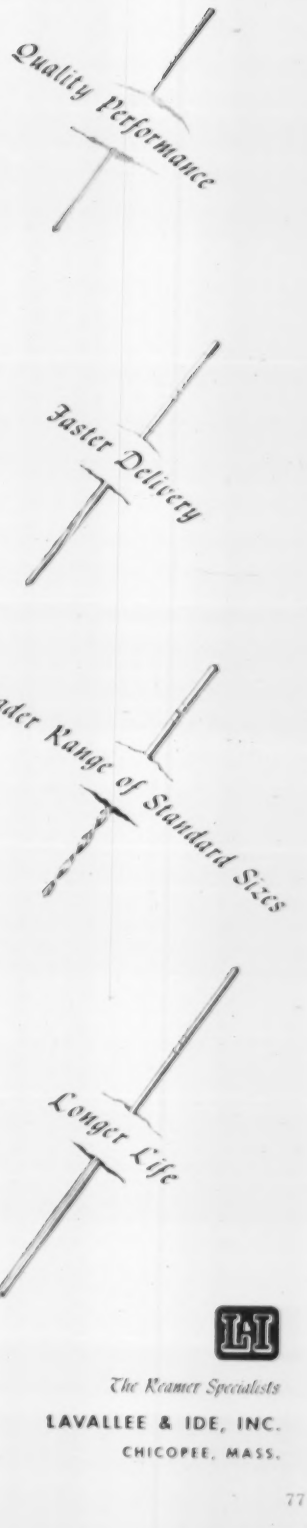
More Roofs Overhead . . .

One of the strongest segments of the economy, private housing, apparently is defying such reports. In February, which usually marks the rise in spring building, new starts on nonfarm housing jumped a more-than-usual 10 per cent. On a seasonally adjusted basis, this is at an annual rate of 1,180,000, which was topped in only four months during the past three years.

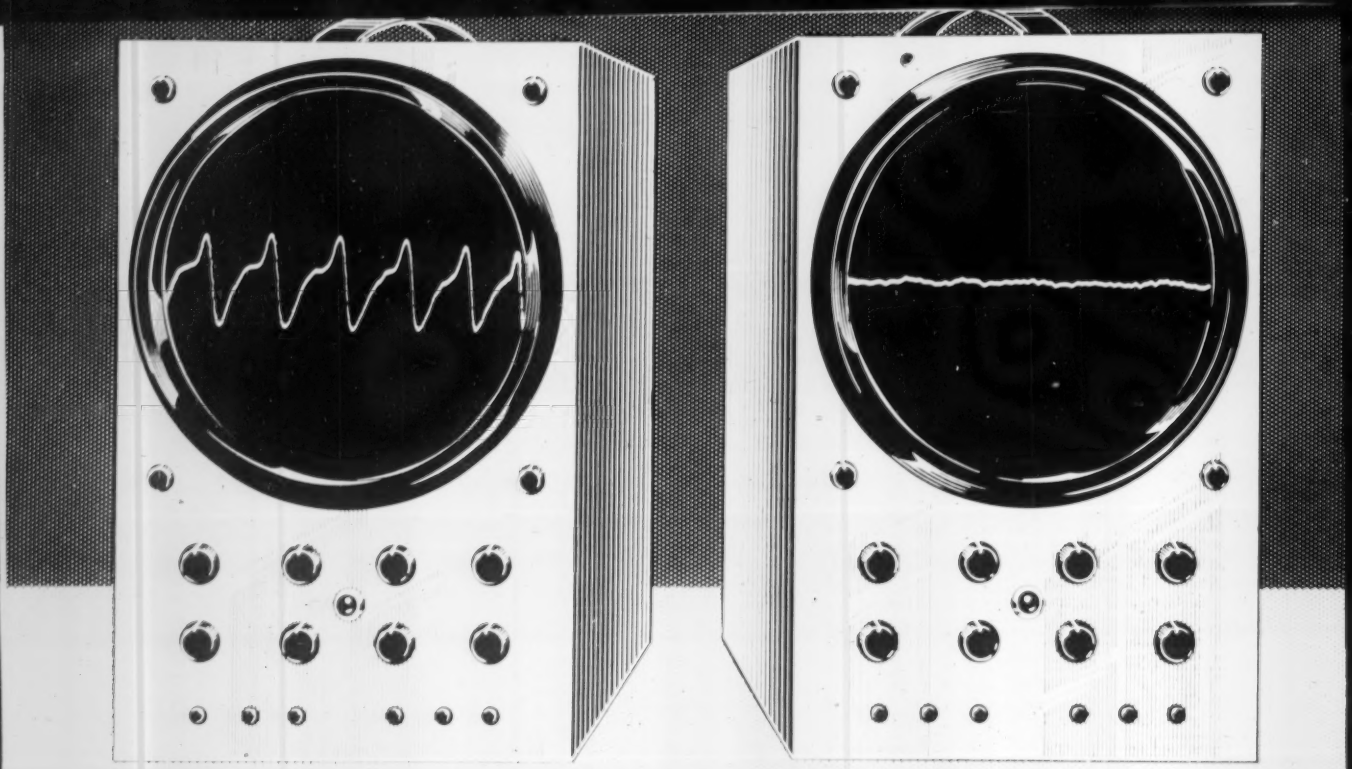
Trends Fore and Aft . . .

Last week, major New York city banks lowered the prime rate on commercial advances from 3¼ per cent to 3 per cent. It was the first cut in 19 years and may foreshadow a trend for all borrowing costs . . . Wholesale price index for the week ended Mar. 16 remained at 110.6 per cent of the 1947-1949 base, which is 0.1 percentage point above the February average . . . Now that March is over and no upturn in production has become apparent, many experts are predicting better things for April. May is next in line . . . It is interesting to note that even though consumers are supposed to be tightening up on their money, Oldsmobile, Buick and Cadillac, the premium cars at GM, jumped from 14.8 per cent of total auto production in March, 1953, to 19 per cent this month . . . One of the most optimistic sales forecasts seen to date comes from Detroit Steel Corp. Pres. M. J. Zivian. He says Detroit Steel sales in 1954 will be up 10 per cent above 1953, but net profit will be down about 10 per cent.

L·I Reamers give you more



L·I
The Reamer Specialists
LAVALLEE & IDE, INC.
CHICOPEE, MASS.



WHEN A STRAIGHT MINERAL OIL was used to lubricate the ways, an 0.0008" jump at frequency of 2.74 cycles per second was noted.

WHEN SUNOCO WAY LUBRICANT was used on the ways, the jump was too small to measure, proof that this medium stops slip-stick motion.

TEST PROVES SUNOCO WAY LUBRICANT ENDS SLIP-STICK TABLE MOTION

How effectively Sunoco Way Lubricant stops slip-stick table motion is graphically illustrated by these oscillograms. The pattern on the left was made with a straight mineral oil as the lubricant; the other was made with Sunoco Way Lubricant on the ways. Both patterns are magnifications of changes in rate of table travel and were obtained under identical conditions.

You can stop slip-stick table motion, protect the ways, get better surface finishes, cut production losses with Sunoco Way Lubricant. Try it in your shop. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. S-3.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of the famous Blue Sunoco Gasoline and Dynalube Motor Oils

JAMES R. COLEY
. . . sec'y-sales mgr., Ajax Electrothermic

MAURICE M. CLEMONS
. . . Sahlin Engineering chief engineer

SIDNEY A. STEWART
Niles-Bement-Pond v. p.

Ajax Electrothermic Corp., Trenton, N. J., appointed **James R. Coley** secretary and sales manager to succeed the late **George F. Applegate. William T. Thomas**, formerly of General Electric Co., joins Ajax as assistant chief engineer.

Kaiser Steel Corp., Fontana, Calif., Works, named **Edward A. Parker** superintendent of plate and 86-inch hot-strip mills and **Paul J. Pismato** assistant superintendent.

Terrence H. M. Taylor, former research scientist with U. S. Atomic Energy Commission, was named chief engineer of Rockwell Mfg. Co.'s **Nordstrom Valve Division** plant at Oakland, Calif.

Caine Steel Co., Chicago, appointed **Robert M. McCluer** manager of its eastern subsidiary, **Caine Steel Co. of Pennsylvania**. He will operate a new warehouse in Philadelphia, opened to serve the Delaware Valley industrial area.

Continental Steel Corp., Kokomo, Ind., elected **Edmond P. Severns** vice president-general manager. Mr. Severns, vice president in charge of sales for the company since 1939, has been with the firm 27 years.

A. H. Hally was appointed general sales manager, **Campbell Chain Co.**, York, Pa. He had been director of sales planning, Permacel Tape Corp.

Maurice M. Clemons was appointed chief engineer of **Sahlin Engineering Co.**, Birmingham, Mich. He previously was with General Motors Corp. for 25 years, most recently serving as master mechanic of the Chevrolet-Cleveland pressed metal division.

W. A. Schueter was named a dealer in the Southwest for products of **Research & Control Instruments Division**, North American Phillips Co. Inc., Mt. Vernon, N. Y. The new organization, to be known as Southwestern Electronics Corp., will occupy a new building on May 1 at 3920 S. Peoria Ave., Tulsa, Okla. Present mailing address is P. O. Box 7275.

Aeroquip Corp., Jackson, Mich., promoted **Marvin W. Brandau** from industrial sales manager to director of market development. He is replaced in his former position by **W. F. Rogge**, formerly with Firestone Tire & Rubber Co.'s World Bestos Division.

R. Smith Schenk, former president of Sun Tube Corp., joined **White Metal Mfg. Co.**, Hoboken, N. J., as consultant.

Melvin Schwartz, formerly with Alpha Metals Inc. in regional sales management, was appointed general sales manager, **Garfield Wire Division**, Garfield, N. J., Overlakes Corp.

Sidney A. Stewart was elected a vice president of **Niles-Bement-Pond Co.**, West Hartford, Conn., and will serve as chief executive officer of the Chandler-Evans Division with the title of manager. Mr. Stewart resigned as executive vice president of Delta-C&S Air Lines to accept the new post which he will assume June 1. He continues as a director of the air lines and is retained by it in a consulting capacity.

Republic Steel Corp. appointed **William S. Tuttle** superintendent of its Troy, N. Y., coke plant to succeed **J. H. Kunkle Jr.**, named superintendent of the coke plant at Warren, O.

Albert F. Lang was made northern Ohio automotive sales representative for **Berger Mfg. Division**, Republic Steel Corp., Cleveland.

Bernard Kearney was named president of **Torsion Balance Co.**, Clifton, N. J.

Fred E. Harrell, vice president, **Reliance Electric & Engineering Co.**, Cleveland, was given additional duties of director of special projects, a newly created position in which he is concerned with new building projects and associated growth problems of the company. **Hugh D. Luke**, former manager of central production planning, be-

JOSEPH M. SCHAEFFER

DAVID C. GRIGGS

. . . executive changes at Waterbury Farrel Foundry & Machine

comes manager of manufacturing of rotating equipment. **Stephen W. Feiss** was made general superintendent of the firm's Ivanhoe Division.

Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., elected **Joseph M. Schaeffer** president. He formerly was a vice president and director of the company and chief engineer of its bolt, nut and screw machinery division. **Richard L. Wilcox**, former president, was elected chairman of the board to succeed **David C. Griggs**, who continues as a director. **Richard C. Bannon**, Cleveland office sales manager, was elected vice president. Vice presidents re-elected are **Fred S. Van Valkenburg** and **Irving H. Tolles**. **A. Dale Mitchell** was elected treasurer to succeed **Lewis S. Reed**, retired.

Jack F. Anschuetz was named assistant sales manager, **Clearing Machine Corp.** Until recently he headed up the sale of gap-type and other medium tonnage presses from Clearing's Chicago sales office. He is now responsible for sales of open-back inclinable presses and other press equipment manufactured at the Hamilton, O., plant.

C. F. Kucera and **Harold H. Ackmann** were made regional representatives for transmission equipment in the southeast and central regional offices of **Allis-Chalmers Mfg. Co.'s** general machinery division. Mr. Kucera will be located at Atlanta, Mr. Ackmann at Cleveland.

City Pattern Foundry & Machine Co., Detroit, appointed **Richard McLean** foundry superintendent, **Frank Heffner** purchasing agent and **Joseph C. Nuttall** in charge of the shipping department.

Clarence Carruthers was elected president, **Hydraulic Starter Corp.**, New York.

Bullard Co., Bridgeport, Conn., elected **Louis J. Baudis** vice president in charge of manufacturing and appointed **C. Harold Anderson** chief engineer. Mr Baudis, who joined the company in 1935, has served in the latter position since 1947. Mr. Anderson has been assistant chief engineer since 1950.

J. E. Compton, formerly chief engineer for All Metals Industries Inc., Latrobe, Pa., who also served with Westinghouse Electric Corp. as a tool and machine designer, joined the field engineering force of **Wesson Co.**, Detroit. He has been assigned to the Pittsburgh area.

Henry A. Getz was appointed manager of the metal division of **National Lead Co.'s** Cleveland branch and will be assisted by **Russell C. Kleinecke**. **C. A. Schneider** is acting manager at Baltimore.

Raymond H. Dobberfuhl was made manager of a new **R & J Dick Co. Inc.** office and warehouse located in Los Angeles.

Waldrip Engineering Co., Hollydale, Calif., appointed **Dr. Joseph Remenyi** chief design engineer and **Freeman Gates** manager of its aggregate and mining machinery division.

Millard D. Shriver was made general sales manager for **Panellit Inc.**, Chicago. He assumes responsibility for sales and sales promotion activities of the parent organization as well as its Panascan Division and a wholly owned subsidiary, Panalarm Products Inc. Mr. Shriver was formerly sales manager of Panellit. He will move his tri-division sales staff to Sko-

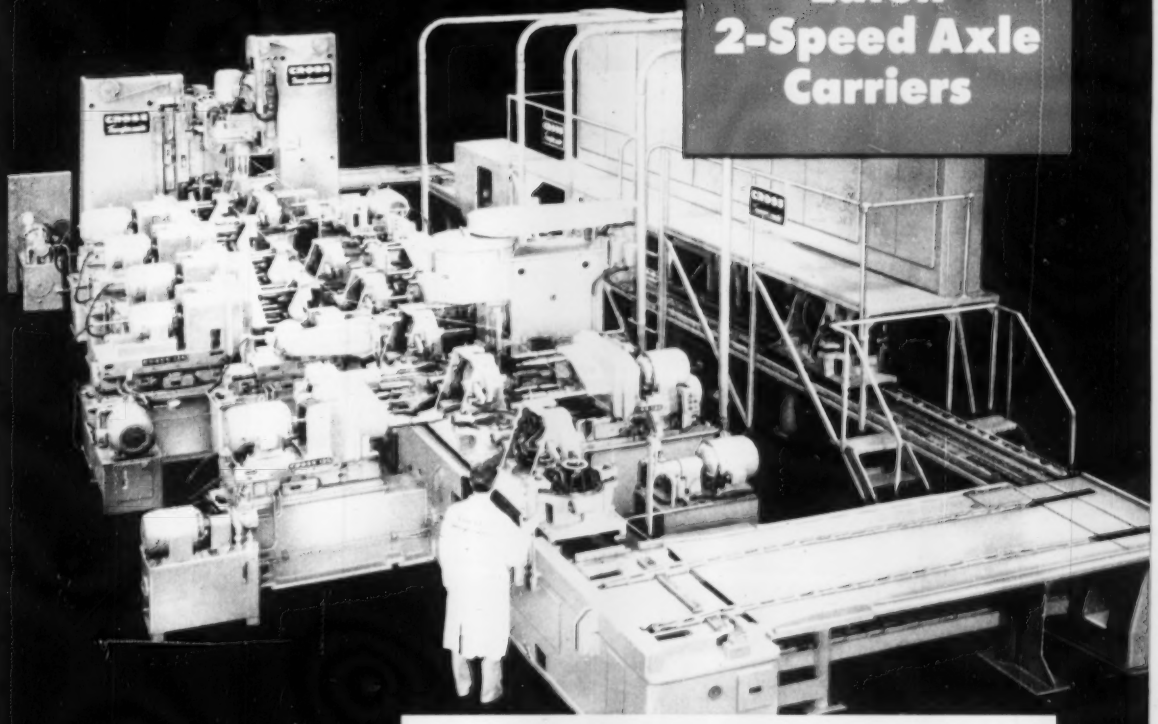
LOUIS J. BAUDIS

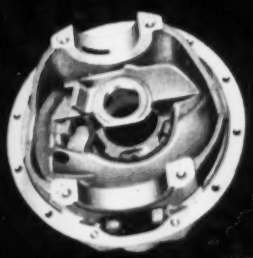
C. HAROLD ANDERSON

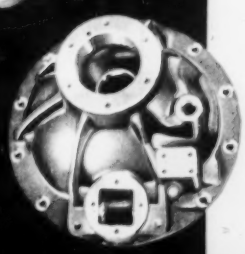
. . . Bullard Co. v. p.-mfg. and chief engineer

Another Transfer-matic by Cross

Mills, Drills and Taps Eaton 2-Speed Axle Carriers







- ★ 53 parts per hour at 100% efficiency—capacity for spiral bevel or hypoid style carriers.
- ★ 97 operations: 60 drilling, chamfering and reaming; 5 milling; 4 spotfacing and counterboring; 28 tapping.
- ★ 9 stations: 1 loading, 1 unloading, 7 machining.
- ★ Two-position, progressive type work holding fixtures with automatic transfer from station to station and integral conveyor for automatic return from unloading to loading station.
- ★ Cleaning unit for removing chips from fixtures between unloading and loading station.
- ★ Other features: Complete interchangeability of all standard and special parts for easy maintenance; construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse; individual lead screw feed for tapping; coolant system; automatic lubrication.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

T. N. BAKER
joins Consolidated Tool & Products

R. CLYDE WOLFGONG
Electro Refractories sales v. p.

CLARENCE FELIX
Crosley Division v. p.

kie, Ill., in June when the new Pamcrit building is completed.

T. N. Baker, formerly with General Motors Corp., was appointed general sales manager, **Consolidated Tool & Products Co.**, Los Angeles. At GM Mr. Baker was manager of the Allison-Aeroproducts office in San Diego, Calif.

Succeeding **Julian L. Schueler** as general superintendent of **Continental Steel Corp.**, Kokomo, Ind., is **Arthur L. Miller**. Named to succeed Mr. Miller as assistant general superintendent is **Donald C. Horsman**. Mr. Schueler retires from active duty Apr. 1 but remains with the company in a consulting capacity for special assignments. **Charles M. Coe** becomes steel division superintendent and **Herman D. Achors** rod mill superintendent.

R. Clyde Wolfgong was promoted from general sales manager to vice president in charge of sales at **Electro Refractories & Abrasives Corp.**, Buffalo. He assumes supervision of all domestic and foreign outlets while retaining the duties he had as general sales manager. **George B. Michie**, a vice president since 1945, was appointed to the new office of director of public relations.

H. J. Karakas was promoted from field engineer to manager of the newly created eastern seaboard sales division of **Pfaulder Co.**, located at New York.

E. R. McClung formerly assistant manager of **American Locomotive Co.**'s ordnance plant in Schenectady, N. Y., was appointed assistant plant manager at the firm's facilities at Dunkirk, N. Y.

Clarence Felix was elected vice president of Avco Mfg. Corp.'s **Crosley Division**, Cincinnati. He continues as general manager of government products for the division. Mr. Felix has been associated with Crosley for 27 years.

Dr. Alexander Blakely joins **Metal Removal Co.**, Chicago, as vice president in charge of manufacturing. Formerly production manager for Vesuvius Crucible Co., he is now in charge of production of all abrasive grinding wheels and discs.

Arthur L. Pierce retired from active service with **American Emery Wheel Works**, Providence, R. I. Connected with the firm for 46 years, he served much of that time as president and director and later as general manager, treasurer and director.

OBITUARIES . . .

Lester F. Nenninger, 59, assistant manager, machine tool division, **Cincinnati Milling Machine Co.**, Cincinnati, and vice president of its sales subsidiary, Cincinnati Milling & Grinding Machines Inc., died Mar. 16.

John W. Floto, 69, vice president, **Globe Steel Tubes Co.**, at Chicago, died Mar. 16.

Martin J. Anderson, 66, former director of engineering research at **Mathews Conveyer Co.**, Ellwood City, Pa., died Mar. 9 in Florida.

Herbert R. Replogle, 66, who retired last year as an executive of **Warren Foundry & Pipe Co.**, New York, died Mar. 11.

George W. Bach, 77, chairman of **American Sterilizer Co.**, Erie, Pa., died Mar. 13.

Ralph Ditty, 77, for more than 30 years president of **Federal Foundry Supply Co.**, Cleveland, died Mar. 17.

Herbert L. Bergman, chief erection engineer of **Surface Combustion Corp.**, Toledo, O., died Mar. 4.

Rudolph Biersach, 70, vice president of **Biersach & Niedermeyer Co.**, Milwaukee, died Mar. 11.

Herman H. Walther, 57, chief metallurgist and a director of **Dayton Steel Foundry Corp.**, Dayton, O., died Mar. 14.

Walter A. Schneggenburger, 57, president, **W. A. Schneggenburger Co.**, Buffalo, died Mar. 15.

William U. Katz, 78, president, **Katz Metal Co.**, La Crosse, Wis., died Mar. 13.

For Atlantic Automatic Co., Cleveland, Ohio:

Tool Life Increased Over 200%!

PARTS FOR GEARS & CAR TRANSMISSIONS are just a few of the many delicate machine tool products Atlantic turns out. Cities Service Chillo Cutting Oil has helped Atlantic maintain their great reputation for quality products.

For the services of a Cities Service Lubrication Engineer... Write Cities Service Oil Company, Sixty Wall Tower, New York City 5, New York.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

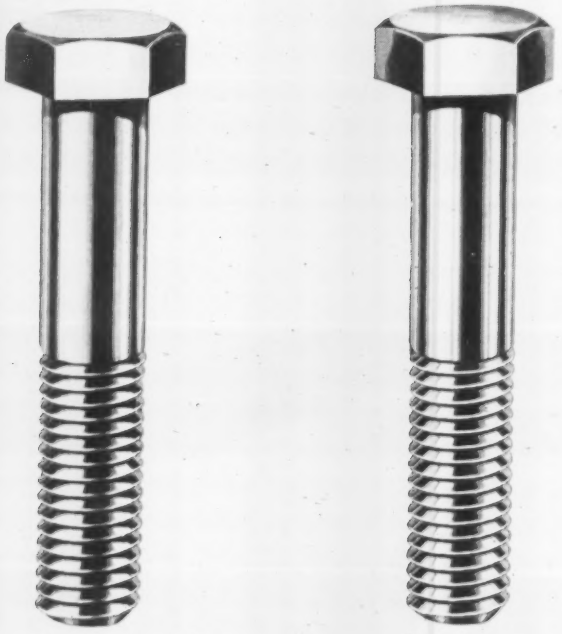
"Cities Service Chillo Cutting Oil Has Proved To Be The Difference Between Ordinary And Quality Production In Our Shop!"

Here's Atlantic Automatic's story in their own words: "One of our tougher jobs recently was machining SAE 446 Stainless Steel with two forming, one threading and three drilling operations. The critical operation was drilling a .025 inch diameter hole, 1/8 inch deep. The drill would soon pack with chips and break. When a Cities Service Lubrication Engineer was called in, he recommended our using Chillo 44.

"This light-colored oil did the trick. DOWN TIME WAS CUT IN HALF AND DRILL LIFE INCREASED OVER 200%!

"We use Cities Service Chillo 44 to machine all types of metals covering a range of machinability from brass to stainless on our Brown and Sharpe 00G, 0G and 2G Automatics. It has proved to be the difference between ordinary and quality production in our shop!"

Which is the Clecap?



. . . the one you got the day you wanted it!

All right, we'll skip the arguments about which of these two cap screws is the best . . . though we can prove that one is better because of the Kaufman *double-extrusion* Process and many other factors.

The BIG DIFFERENCE, if you ask long-time Clecap buyers, is the Clecap organization that cheerfully "breaks its neck" to get you what you want exactly when you want it. An astonishing record over the years!

Why not enjoy the comfortable worryless feeling a lot of buyers get by putting all their cap screw needs up to Clecap?

The Cleveland Cap Screw Co.

2935 EAST 79TH STREET • CLEVELAND 4, OHIO

VUlcan 3-3700 TWX CV42

WAREHOUSES: CHICAGO • PHILADELPHIA • NEW YORK
PROVIDENCE • LOS ANGELES

Cleveland

Top Quality

Fasteners

Ferrous and Non-Ferrous

Hex Head Cap Screws—Bright and High Carbon Heat Treated Steel, Brass, Silicon Bronze, Stainless Steel; ¼" to 2½" dia.

Socket Head Cap and Set Screws—Plain and Knurled: ¼" to 1½" dia. Also Flat and Button Head Styles

Flat Head Cap Screws: ¼" to 1" dia.

Fillister Head: ¼" to 1¼" dia.

Set Screws—Square Head: ¼" to 1½" dia.

Milled Studs: ¼" to 1¼" dia.

Place Bolts: ¼" to 1⅛"

Structural Bolts

Tractor Bolts

Facilities to make larger diameters than listed.

Special Hot and Cold Headed Parts

Ask Your Jobber for Clecap!

Originators of the Kaufman DOUBLE EXTRUSION Process

Upgrading Project Started

National Lead and Republic Steel join forces to concentrate low-grade southern iron ores

NATIONAL LEAD CO. and Republic Steel Corp. announced a joint project to upgrade southern iron ore and iron materials. Its success would result not only in upgrading of ore now usable but also in the utilization of mineral resources which are now of little economic value and have not been usable by the steel industry.

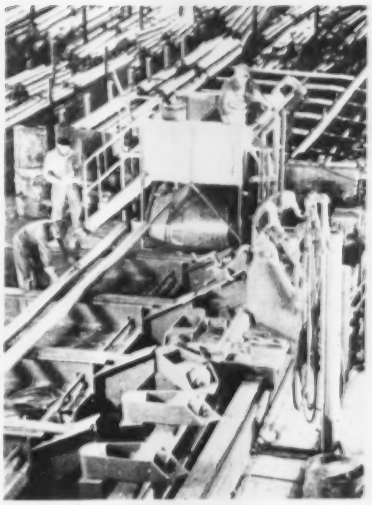
A large-scale pilot plant is now under construction at Republic's Spaulding iron ore mine near Birmingham where production-scale studies of the contemplated upgrading project will be made. The pilot plant will be completed and in operation this summer. The iron ore concentrate to be produced is expected to be upgraded sufficiently to warrant its use in modern blast furnaces.

Spokesmen for the two companies point out that though there are still deposits containing millions of tons of high-grade iron ore in the United States these deposits are rapidly being depleted. However, the nation's reserves of low-grade nonmagnetic iron ores and other materials too lean to be considered as ores today run into the billions of tons. A method of upgrading these nonmagnetic ores will extend considerably the usable reserves of the country.

In the Birmingham basin alone, reserves of ferruginous sandstone exceed 1 billion tons with iron content running about 25 per cent, according to U. S. Bureau of Mines. If this and other marginal ore can be upgraded to a commercial level the production life of iron minerals in the basin may be extended 200 years, the bureau estimates.

Reliance Electric To Build

Reliance Electric & Engineering Co., Cleveland, manufacturer of electric motors and power drives for industry, placed contracts for an addition to its Ashtabula, O., plant. It will duplicate the manufacturing capacity of the company's original Ashtabula plant, completed in 1947. The new plant will be used to produce alternating current motors, built to recently announced revisions in design standards of National Electrical Manufacturers Association. Reliance ac motors of present design will continue to be made in the existing plant in that city.



New 'Peeler' Goes to Work

Pittsburgh Steel's new "peeler" at its Allenport, Pa., seamless tube mills can machine off approximately ⅛ in. of surface from 4½ to 9½ in. diameter steel billets 24 to 34 ft in length at a rate of about 184 fpm

Steel Casting Firm Organized

Quaker Alloy Casting Co. will start producing small carbon, low-alloy stainless and high-alloy castings in its Myerstown, Pa., plant about Apr. 1, using two 650-lb induction furnaces. The company was established by Leroy G. Miller, John Juppenlatz and James J. Blauch.

West Coast Firms Merge

Malco Co., Los Angeles, manufacturer of tinware, combined manufacturing facilities with Western Aluminum Rolling Mills and will operate as Aluminum Container Corp.

Will Make Replacement Parts

Buffalo Weaving & Belting Co., Alliance, O., organized an Automobile Parts Division with George Schofield as sales manager. The division will produce automobile headlight replacement units which Mr. Schofield developed.

Reichl Organizes Company

R. M. Reichl Co. has been organized to specialize in development-engineering, process-development and consulting, with offices at 110-11 70th Rd., Forest Hills, Long Island, N. Y. The company was organized by R. M. Reichl, formerly vice president of Hydropress Inc., New York, who has been active in the field of heavy presses, extrusion, hydraulic machinery, pipe mills and rolling mills for over 20 years.

Will Boost Lithium Output

Foote Mineral Co., Philadelphia, plans further expansion of facilities for the production of lithium ores and chemicals. The program includes major additions at the company's Kings Mountain, N. C., and Sunbright, Va., plants. Facilities at the Exton, Pa., plant will be increased to a lesser extent. Cost of the proposed expansion is estimated at several million dollars.

American Can To Open Plant

American Can Co., New York, will open a plant in Denver for the manufacture of beer and food cans. The plant structure will be built by Cabot, Cabot & Forbes Inc., Boston, industrial development firm, and will be leased by American Can under a long-term arrangement. American Can will equip the factory with its own production machinery.

M.M.&M. Plans Expansion

Manning, Maxwell & Moore, Aircraft Products Division, is planning a new building, 50,000 sq ft, at Danbury, Conn., to be completed late this year.

Mesta Expresses Optimism

Mesta Machine Co., West Homestead, Pa., producer of heavy machinery, reports net income in 1953 of $3,500,416, after all charges including provision for taxes, compared with $2,709,597 in 1952. Federal and state income taxes amounting to $4,125,000 were accrued for the year

(*Please turn to page 88*)

To help your salesmen step ahead of competition

Put the strength of STEEL

into your

138,000 Management, Production, Engineering and Purchasing executives in metalworking read it . . . use it . . . depend upon it!

advertising program

[illegible]

Cylindermaker Changes Name

[illegible]

Cannon Forms Subsidiary

[illegible]

Reliance Steel Expands

[illegible]

Salem-Brosius Buys Firm

[illegible]

Westinghouse Plans Plant

installation to have equipment for basic metalworking and the newer foundry techniques

WESTINGHOUSE Electric Corp. will begin construction in May of a multimillion dollar metals plant at Blairsville, Pa. The main building exterior should be finished by the end of this year and the plant is expected to be in operation by mid-1955.

"The main purpose of this new metals plant," said Warren M. Trigg, plant manager, "will be to bridge the gap between research and the commercial application of metals in the electrical industry." Mr. Trigg indicated that the Blairsville metals plant will work closely with the new Westinghouse Research Center now under construction in Churchill Borough.

The plant will provide equipment for the basic metalworking processes of melting, forging, [illegible] and heat treating. In addition, facilities will be installed for the newer foundry techniques of investment casting and shell mold casting and equipment will be provided for limited manufacture of powder metal parts. It is expected that the plant also will have some capacity for the manufacture of special metals for various Westinghouse operating divisions.

$10,000 Worth of Valve

Titanium and silver diaphragm control valve costing $10,000 was one of two built by Minneapolis-Honeywell to handle high pressure service of corrosive fluid. Silver lining adds one year to body life. Solid titanium valve trim will last only 70 days.

Mars Broadens Product Line

Mars Engineering Inc., Newark, N. J., added a new division which will design industrial dust collection and fume elimination systems. Previously, the company specialized in the design and manufacture of machinery.

Dempsey To Build Furnaces

Dempsey Industrial Furnace Corp., Springfield, Mass., was awarded a contract for eight oil-fired aluminum heat-treating furnaces for the government-owned plant operated by Kaiser Aluminum Co. in Halethorpe, Md. Cost will approximate $350,000.

REPRESENTATIVES

American District Steam Co., North Tonawanda, N. Y., is opening a western division sales office in San Francisco. R. Z. Silcock will be in charge.

Beckman & Whitley Inc., San Carlos, Calif., appointed Gay Sales Co., Houston, as its representative in that territory, handling the company's line of meteorological instruments and heat-flow transducers.

Berylium Corp., Reading, Pa., appointed Meier Brass & Copper Co., Detroit, as distributor of its berylium-copper strip and rod in that territory.

Boston Woven Hose & Rubber Co., Cambridge, Mass., opened a large warehouse in Chicago at 2651 Gardner Rd., Broadview. The firm's products include conveyor, elevator and flat transmission belts. Vetelts, industrial garden and fire hose, tubing, packing, tapes, stair treads and matting.

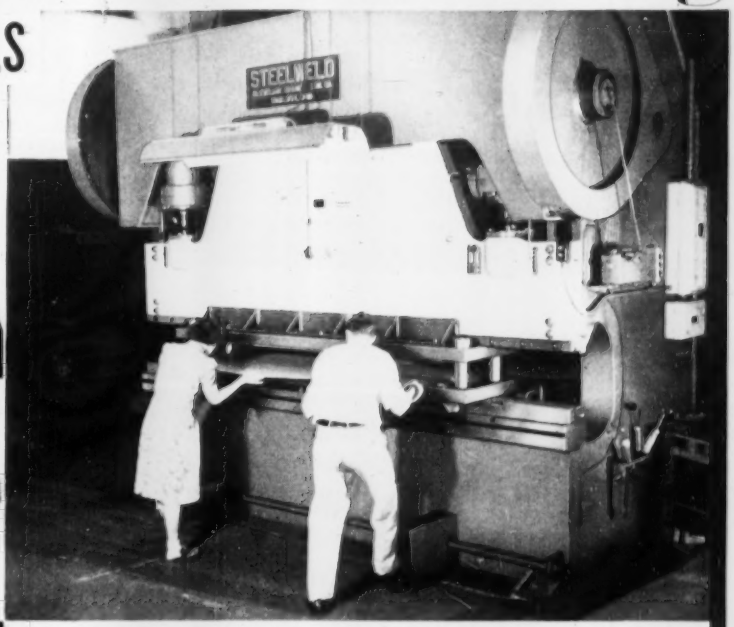
R. & J. Dick Co., Passaic, N. J., opened an office and warehouse at 5276 Atlantic Blvd., Maywood, Los Angeles, Calif. An inven-

Please turn to page 91

blanking and embossing

ACOUSTIMETAL PANELS

4800 panels for 12" x 24" sound-deadening cells are blanked out and embossed per 8-hour day with these dies.



This rugged smooth-working press performs nearly every kind of metal forming operation at Dussing & Hunt, Inc.—bending, forming, flanging, blanking, embossing, and punching. It is easy to change the dies from one job to another or repeat previous runs of work to close tolerances.

Of the many types of work performed on the Model J4½-10 Steelweld Press at Dussing & Hunt, Inc., Buffalo, N. Y., the blanking and embossing of panels for Acoustimetal sound-deadening cells is one of the most interesting.

Large sheets of 26 gauge perforated metal are fed into the dies attached to the bed and ram, by the man operator and his woman assistant. At each stroke of the ram three panels are blanked out and embossed. Six panels for 12" x 24" cells are made from each sheet. 100 sheets are passed through the press per hour. Thus, 600 panels are turned out per hour, or 4800 per eight-hour day.

A large variety of metal parts are produced on the Steelweld. Included are 22-gauge stainless steel tops for deep-freeze cabinets with neatly rounded flanges, fire-proof doors and all-steel industrial doors of 10 to 14 gauge, 14-gauge pressed steel frames, heavy steel channels and many other parts.

The press was installed in 1942 and has been kept going continuously. The Plant Manager of this rapid-growing concern says, "It has proved very satisfactory and efficient."

Acoustimetal panels are produced with such speed that one man is kept busy at the rear of the press removing the scrap and a woman is fully occupied stacking the panels as they roll down the conveyor from the press bed.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

7831 East 281st Street, Wickliffe, Ohio

STEELWELD

BENDING PRESSES

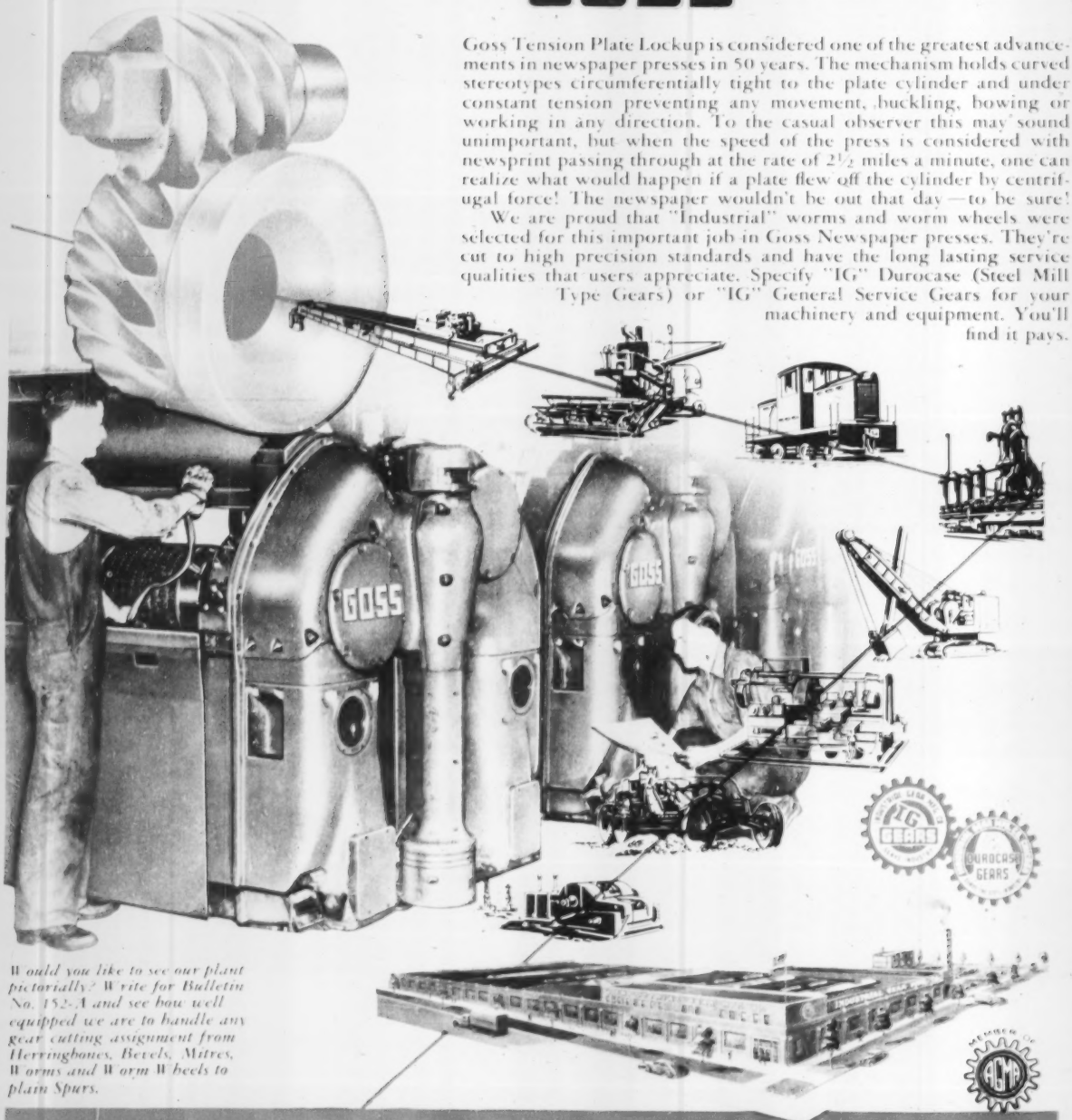
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

"Industrial Gear"

WORM AND WORM WHEELS ACTUATE THE PLATE LOCKING AND UNLOCKING MECHANISM ON GOSS HEADLINER PRESSES

Goss Tension Plate Lockup is considered one of the greatest advancements in newspaper presses in 50 years. The mechanism holds curved stereotypes circumferentially tight to the plate cylinder and under constant tension preventing any movement, buckling, bowing or working in any direction. To the casual observer this may sound unimportant, but when the speed of the press is considered with newsprint passing through at the rate of 2½ miles a minute, one can realize what would happen if a plate flew off the cylinder by centrifugal force! The newspaper wouldn't be out that day—to be sure!

We are proud that "Industrial" worms and worm wheels were selected for this important job in Goss Newspaper presses. They're cut to high precision standards and have the long lasting service qualities that users appreciate. Specify "IG" Durocase (Steel Mill Type Gears) or "IG" General Service Gears for your machinery and equipment. You'll find it pays.



Would you like to see our plant pictorially? Write for Bulletin No. 152-A and see how well equipped we are to handle any gear cutting assignment from Herringbones, Bevels, Mitres, Worms and Worm Wheels to plain Spurs.

Industrial Gear Mfg. Co.

4545 W. VAN BUREN ST.
CHICAGO 24, ILLINOIS

(*Continued from page 88*)

tory of power transmission and conveying equipment will be maintained. The company also has West Coast offices in San Francisco and Seattle.

Fansteel Metallurgical Corp., Chicago, opened a regional sales office in Houston. Lawrence C. Rodgers heads the office which serves Texas and Louisiana.

Firth Sterling Inc., Pittsburgh, appointed as distributors of its steel and carbide products Denman & Davis, North Bergen, N. J.; O'Neal Steel Co., Birmingham; Mau-Sherwood Supply Co., Cleveland; and Standard-Shannon Supply Co., Philadelphia.

Gar Wood Industries Inc.'s St. Paul Hydraulic Hoist Division, Minneapolis, appointed Corts Commercial Body Works, Whitesboro, N. Y., and Timpte Bros. Inc., Denver, as distributors of its hoists and bodies, elevating end gates and other products.

Graybar Electric Co. Inc., New York, opened a branch office and warehouse at 524 E. St. Louis St., Springfield, Mo. R. L. Shuck is branch manager, and W. Frazier midwestern district manager.

Reading Tube Corp., New York, is opening a distribution depot in Cleveland to improve delivery service of tubing and pipe to customers in Ohio and parts of Michigan. Manufacturing facilites of Reading Tube are located in Reading, Pa.

NEW ADDRESSES

Armco Steel Corp., Middletown, O., moved its Indianapolis sales office to 1839 N. Meridian St. Armco Drainage & Metal Products Inc., a subsidiary, has offices in the same location.

The Atlanta office of **Dravo Corp.**, Pittsburgh, has been moved to Room 361, 1401 Peachtree St. N.E. The Atlanta office handles Dravo's line of warm air space heaters, crane cab and steel mill

(*Please turn to page 94*)

Beautiful TROY Furniture is painted with RANSBURG Electro Spray

This Ransburg unit in the Troy Sunshade Company plant, Troy, Ohio, provides flexibility required to apply finish coat to either large or small parts of indoor-outdoor furniture.

Casual Americana

Increased production demands in the Troy Metal Furniture line made it necessary for Troy Sunshade Company to completely overhaul . . . modernize . . . and centralize their painting operations. And, after careful study and investigation of modern coating methods, Ransburg No. 1 Process was selected for applying the finish coat to their popular line of indoor-outdoor furniture.

Twelve different colors are used on the complete line of Troy products, and from 2 to 6 color changes are made daily. One of the greatest advantages of the Ransburg Electrostatic unit is the ease and simplicity of quick color change. Rejects and rework — which formerly were a serious problem — are reduced to less than 1%.

In addition to substantial savings in material and manpower, Ransburg Electro Spray is helping account for increased production with a more uniform — and higher quality — finish at less cost.

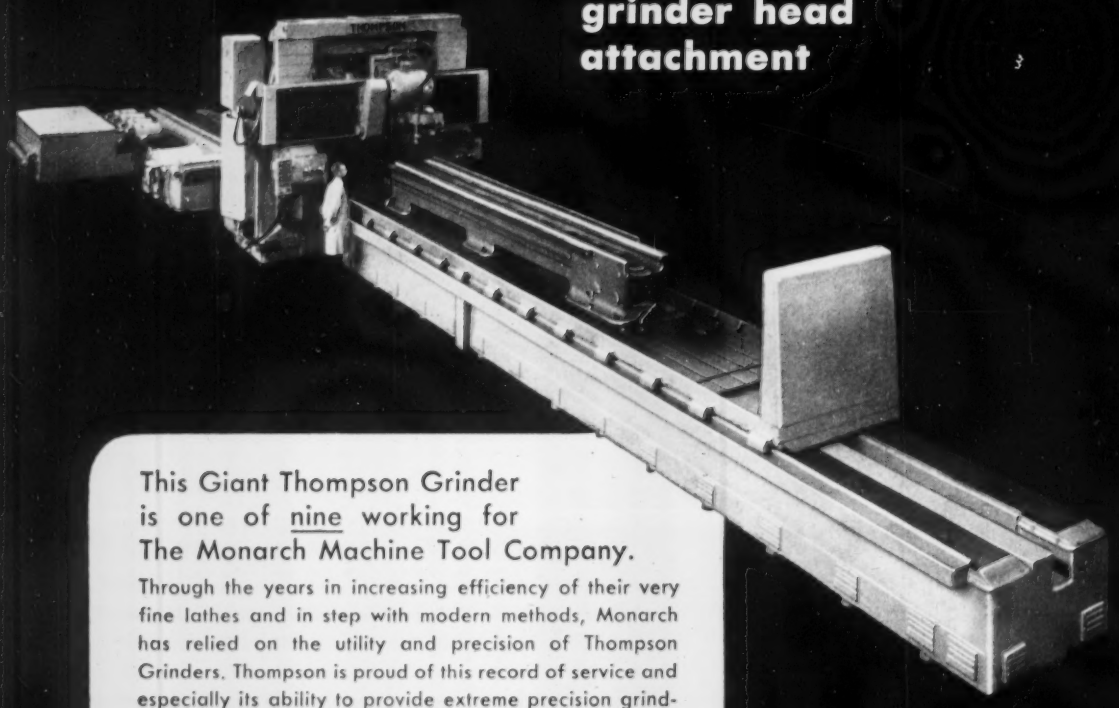
Check the unmatched efficiencies of the Ransburg Electrostatic Processes for possible use in YOUR painting operation. Write for Literature, or send for our sound and color movie, "Miracles in Painting" which shows numerous on-the-job examples of Ransburg Processes at work in industrial plants all over the nation.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

Monarch

Replaces a planer equipped with grinder head attachment



This Giant Thompson Grinder
is one of nine working for
The Monarch Machine Tool Company.

Through the years in increasing efficiency of their very fine lathes and in step with modern methods, Monarch has relied on the utility and precision of Thompson Grinders. Thompson is proud of this record of service and especially its ability to provide extreme precision grinding on this largest of all surface grinders.

INSTALLS WORLD'S LARGEST...

Surface Grinder

precision grinding lathe bedways up to 32 ft. long to a tolerance of five ten-thousandths of an inch .0005"

The precision of Thompson Way Grinders is exemplified in this giant new machine recently installed in the plant of the Monarch Machine Tool Company of Sidney, Ohio. Monarch lathes are known the world over for their extreme efficiency and accuracy, therefore, in the machining of the bedways of their longest machines they had to depend on grinding equipment that maintained exceptional accuracy over entire surfaces up to 32 feet in length. This accuracy is perfectly maintained on this Thompson Way Grinder to five ten-thousands of an inch.

Thus, this surface grinder is not only the World's largest but size for size, one of the World's most accurate machines. The overall length is 79 feet and it measures 13 feet high and 13½ feet wide. Yet in spite of its size all operations are easily controlled by a single operator automatically from the convenient suspended push button control panel. This is typical of Thompson centralized control available with all types and sizes of Thompson Grinders. It will pay you to consult Thompson Engineers in finding an economical solution to *your* problems.

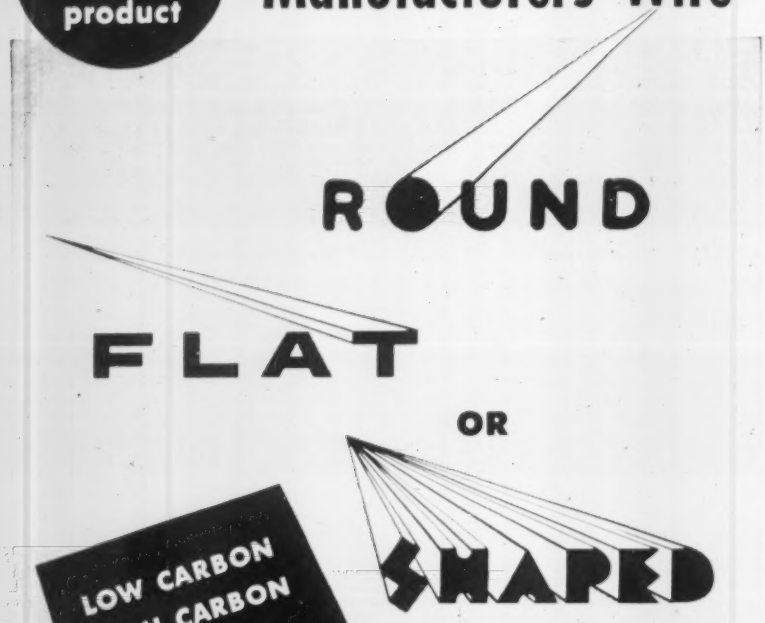
Have Thompson Engineers solve your grinding problems

THE THOMPSON GRINDER COMPANY
Springfield, Ohio

Thompson Grinders

an ACCO product

PAGE
Manufacturers' Wire



LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON

PAGE *makes them all*

YOU draw the Shape...
PAGE will draw the Wire

Cross-sectional areas up to .250" square; widths up to 3/8"; width-to-thickness ratio not to exceed 6 to 1.

Tell us the way you want it. We'll follow your specifications.

Write or wire today

ACCO
Page Steel and Wire Division
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

plus
Welding Electrodes
Wires
Rods

(*Continued from page 91*)

pulpit air conditioners, prefabricated piping and construction services.

Briggs Mfg. Co., manufacturer of bathroom fixtures, moved its general offices to 300 Buhl Bldg., Detroit 26. Manufacturing facilities remain at 3001 Miller Ave., that city.

C. S. Bell Co. moved from Hillsboro, O., to Dayton, O. The firm makes burr and hammer type grinding mills, coffee pulpers, corn shellers and feed mixers.

ASSOCIATIONS

John W. James, vice president in charge of research for McDonnell & Miller Inc., Chicago, was elected second vice president of American Society of Heating & Ventilating Engineers, New York.

R. C. Holbrook, president, Liquid Carbonic Canadian Corp. and a director of Liquid Carbonic Corp., Chicago, was elected president of Compressed Gas Association, New York.

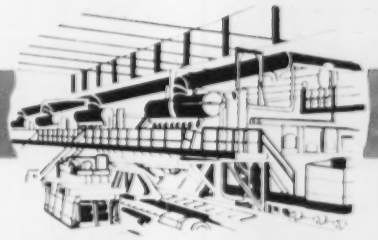
Industrial Unit Heater Association, Detroit, elected the following officers: President, **I. W. Clark**, manager of the heating and ventilating department, American Air Filter Co. Inc., Louisville; vice president, **W. G. Schlichting**, sales manager, Heating, Cooling & Air Conditioning Division, Young Radiator Co., Racine, Wis. **G. W. McCormick Jr.** is secretary-treasurer.

Harold A. Daschner, East Lansing, Mich., has been appointed assistant manager of Pressed Metal Institute, Cleveland, a national association for the metal stamping industry.

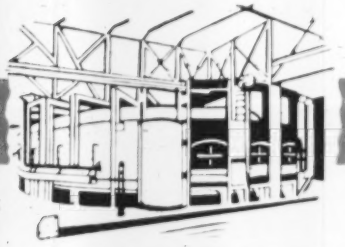
Cutting Tool Manufacturers Association, Detroit, elected as its president **Robert H. Wolfe**, president of Arrow Tool & Reamer Co., that city. **K. R. Beardslee**, general manager, Carboloy Department, General Electric Co., was elected vice president of the association

Ask the men

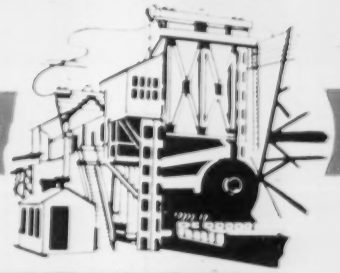
who operate them



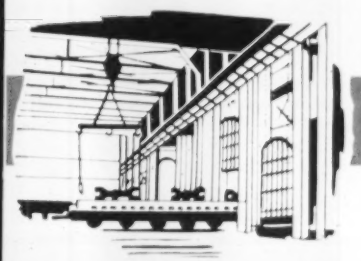
OPEN HEARTH · SLAB HEATING



ROTARY HEARTH · SOAKING PITS



ALL TYPES OF ANNEALING



CAR BOTTOM · FORGING · OTHERS

they all say RUST FURNACES

do a better job for every metallurgical heating need

"Efficient . . . economical . . . automatic . . . all fuels . . . easy to operate . . . trouble free . . ." Furnace men attest the dependability of all types of Rust furnaces serving metal making plants throughout the world. Patented zone-fired installations account for more than one-third of the heating capacity (excluding soaking pits) of America's iron and steel industry. Also in general use are many of the Company's soaking pits. Rust builds both regenerative and recuperative type pits. Whatever your need there's a type of Rust Furnace (individually designed) to do your job.

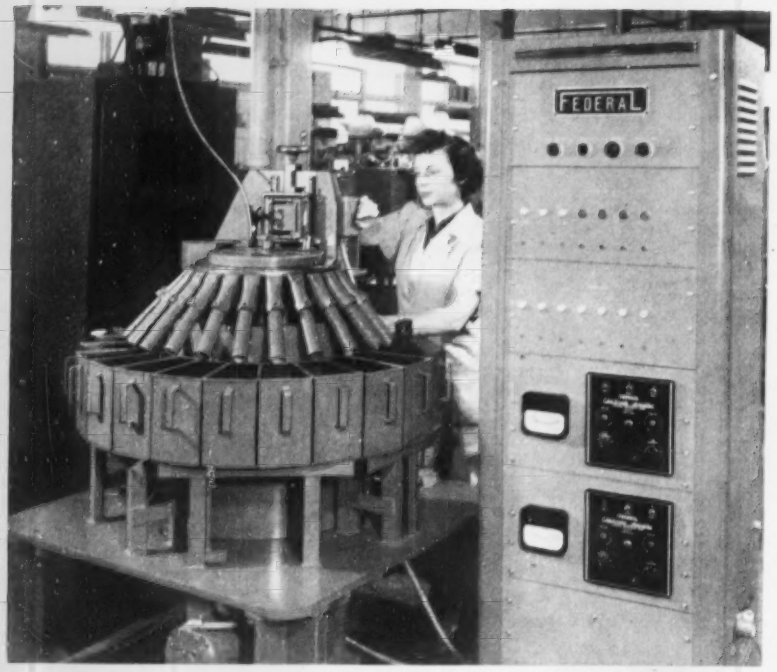
THE WHOLE JOB IS ONE JOB WITH A RUST "PACKAGE" CONTRACT

One contract covers everything . . . from blueprint through start up. Rust assumes responsibility for design, manufacture, erection, and is prepared to undertake all phases of the work with its own forces, including wiring and piping. This results in substantial savings . . . One profit instead of pyramiding ones which accrue where many subs are employed.

RUST FURNACE COMPANY

Pioneers in Furnace Design

RUST BUILDING **PITTSBURGH, PA.**



100% Inspection Pays as this Federal Electronic Sorting-Gage automatically measures 3000 roller bearings an hour. It checks their O.D. and length . . . sorts into 12 acceptable classifications 0.0001" apart . . . sends off-size bearings to "scrap" or "salvage".

100% Inspection Is Now Profitable!

Quality vs. Cost is no longer a battle in many mass-production plants. Their process, production and quality control engineers have struck a perfect balance. They did it by installing high-speed measuring, dimensional control and sorting equipment in their production lines.

How can you improve quality while increasing profits? It's easy to find out. Just send for the bulletin "High-Speed Automatic Gaging and Sorting by Federal". It shows how Federal automatic gages are achieving results like these:

1. **Slashing rejects as much as 35%** while sorting into 16 size categories 0.0001" apart.
2. **Maintaining accuracies of better than 0.00005" all day long** by measuring work in process and automatically adjusting the machine to hold tolerances.
3. **Inspecting and sorting for 9 separate specifications** at a speed of more than 3000 pieces an hour.
4. **Sorting 7200 odd-shaped pieces an hour** into 5 "good" groups while rejecting "bad" pieces for either of two wrong angles.

Seeing's believing! These and more than 40 other case studies are covered in detail in Federal's bulletin 72 on "High Speed Automatic Gaging and Sorting". It will help your engineers: (1) Federal has already solved your sorting or dimensional control problem; (2) An existing Federal gage may be easily adapted for your purposes; or (3) Federal engineers can develop the gage that will make 100% inspection pay off for you. So, write for your copy today. Federal Products Corporation, 4213 Eddy Street, Providence 1, R. I.

Ask **FEDERAL**

FOR ANYTHING IN MODERN GAGES...

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting or Machine Size Control

while **R. S. Spencer**, president of Detroit Boring Bar Co., was re-elected treasurer.

Heating & Cooling Coil Manufacturers' Association, Detroit, elected **P. G. Kayser** of the heat transfer section, McQuay Inc., Minneapolis, president; **W. C. Jones**, section engineer of the extended surface section, Westinghouse Electric Corp., Pittsburgh, vice president; and **G. W. McCormick Jr.**, secretary-treasurer.

Seeks New Alloys

DEVELOPMENT of new magnesium base alloys, containing additions of titanium, hafnium, rhenium, yttrium and other high-melting point elements is the objective of a new research program. It is being conducted by Prof. Ralph R. Nash of the metallurgical engineering faculty at Rensselaer Polytechnic Institute, Troy, N. Y., and is sponsored by Wright Air Development Center, Materials Laboratory, Wright-Patterson Air Force Base near Dayton, O. This study is expected to be completed by February, 1955.

The program is in anticipation of the day when materials must meet higher requirements in strength at elevated temperatures developed in high-speed aircraft. Results of this research will contribute to the continued development of new high-strength magnesium alloys for use as structural materials in future aircraft.

ANNIVERSARIES

Open Steel Flooring Institute Inc., Pittsburgh, celebrated its 25th anniversary as the organization representing the grating industry. The institute's activities have included the adopting of standard specifications, technical standards and engineering procedures to assure quality products and installation.

Spare Parts for People

—better than the Original Equipment

Somewhere, sometime, someone will walk, run, stand straight and strong again, thanks to the "spare part" pictured here. It is a Roger Anderson Femoral Head to the medical men, the "ball" of a hip joint to us laymen.

And it is actually *better* than the broken part it will replace. It won't break, pit, corrode or wear out. The strong, slender, thin-walled tube that supports the actual head is far more resistant to bending and breaking stresses than a much more massive human bone. The entire structure is super-smooth, will stay that way for life. No future replacements will be needful. The tube is a short length of Carpenter stainless tubing, delivered "ready-for-use" after simple fabrication.

It is not probable that you will have a similar job for Carpenter stainless, but whatever your tubing requirements you will find, like this customer, that service-satisfaction is sure when you call Carpenter.

Branch Offices: Atlanta Chicago Pittsburgh Houston Newark San Francisco

The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N.Y. "CARSTEELCO"

Carpenter

STAINLESS TUBING & PIPE

· Analysis · · Tolerance · · Finish ·

- guaranteed on every shipment

HOW CAN YOU

assure long life

FOR EXPENSIVE DIES?

DANLY PRESSES

help solve the problem

Costly dies prepared for stamping motor armature laminations represent an investment that must pay off in production efficiency. Along with die design and material handling methods goes the selection of the *right presses* to insure this die performance.

Danly's *rigid, balanced, precise construction* decreases vibration and deflection, increases die life. In General Electric's plant at Erie, Pa., Danly Autofeed Presses are helping to make investment in lamination dies pay off. The slide to bed parallelism of these Presses was set to a total variation of only .002" at installation. After 2 years of operation, this original setting has not varied!

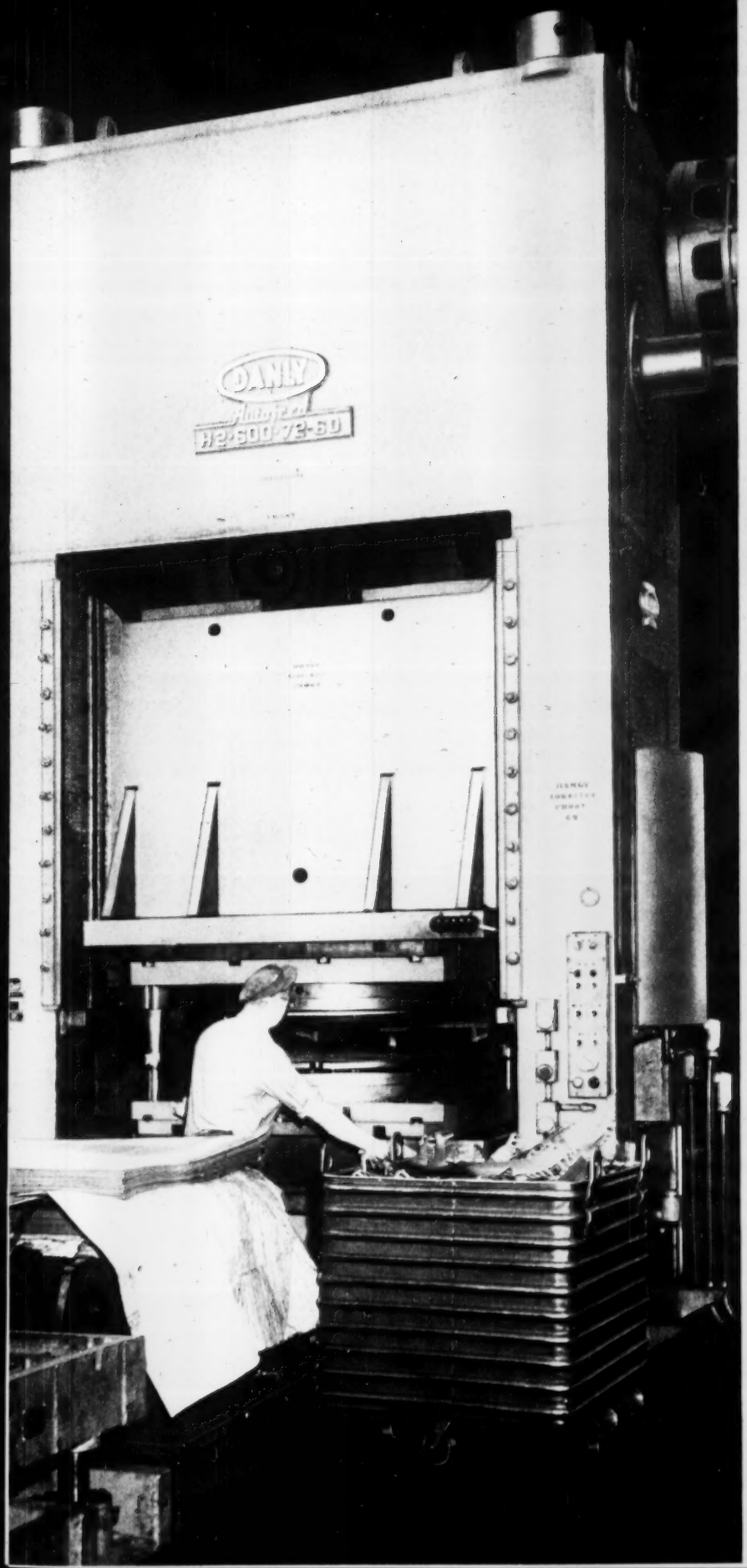
There are basic reasons for Danly Press *precision* performance . . . and definite reasons why management finds it pays to be *cost* conscious instead of *price* conscious in purchasing mechanical presses.

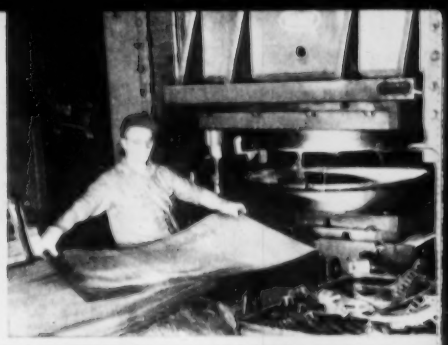
DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

PROVED AGAIN... It costs less to run a DANLY PRESS!

If your manufacturing process involves high production and expensive dies, it will probably be worth your while to talk with a Danly Press Engineer. Call now—he will be glad to discuss your specific problems. There is no obligation for this service.





Steady, Uninterrupted Output

Records show that this 600 ton Danly Autofeed Press has required remarkably little maintenance since installation. Far greater frame rigidity protects punch die and press, permits tight quality control, assures longer production runs at higher operating speeds.

Automatic Oil Lubrication

Gibs are automatically lubricated with oil permitting closer, more precise slide alignment. Slide to bed parallelism of .002" has been maintained for over 2 years with resulting advantage of longer die life. Oil lubrication is also automatically supplied to all drive elements.

Automatic Piece Part Handling

General Electric engineers designed and built the automatic extracting mechanism shown. This device extracts both center hole slug and finished 43" lamination from the 600 ton Danly Autofeed Press shown at left and deposits them in two easily handled stacks.

DANLY

MECHANICAL PRESSES . . . 50 TO 3000 TONS
SINGLE, DOUBLE, TRIPLE ACTION
AUTOFEED . . . UNDERDRIVE

Repair costs? Records show less than $3 per battery per year

Users of EDISON batteries to power their industrial trucks enjoy big economies in the cost of repairs. Here are some figures that indicate how small this cost usually is. These records show the amounts billed to various customers for cell repairs, paint, electrolyte, tools and replacement parts over periods ranging from five to ten years.

For one customer, operating 103 batteries, these amounts averaged $2.89 per battery per year over a period of five years. For another customer, operating 44 batteries, the average was $1.25 per battery per year over a period of ten years. Still another customer, operating 29 batteries, had an average of $1.70 per battery per year over a six-year period.

Steel cell construction and a foolproof principle of operation are the major reasons these costs are so low. For complete information, why not send for bulletins 3808 and 2039, and request a visit from the Edison field engineer nearest you. Write Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.

Most dependable power... lowest over-all cost you get both with an EDISON

EDISON

Nickel · Iron · Alkaline

STORAGE BATTERIES

EDISON ALSO MAKES THE FAMOUS "V.P." VOICEWRITER AND THE TELEVOICE SYSTEM

STEEL
March 29, 1954

Technical Outlook

BAUXITE SUBSTITUTE— Aluminous material, found in an extensive deposit of weathered igneous rock in the Pulaski area of Virginia, promises to open up a new feed source for aluminum reduction pots. Material is 14 to 28 per cent gibbsite ($Al_2O_3 \cdot 3H_2O$), clinging to a finely divided silica matrix. Fred M. Sievert Associates, Cleveland, backers of the development, have a mechanical separation process that yields a gibbsite concentrate containing less than 6 per cent silica.

FIRE PROTECTION— A new fire-retardant paint immediately swells and chars on contact with flame or excessive heat—to form a firm, insulating blanket of non-combustible ash over the affected surface. Called Duo-Tex, it is a product of Glidden Co. An interior finish, it comes in 12 pastel colors and is recommended for coating of acoustical tile and low-cost wallboard.

REVISED SPECS— Twelve boiler and pressure vessel plate specifications have been revised by American Society of Testing Materials' Committee A-1 on Steel. The revised specs are those establishing ladle and check analysis ranges for silicon, chromium, nickel, molybdenum, vanadium and manganese when specified as a range.

EXPANSION IN BORIDES— Since 1946, Office of Naval Research has allotted considerable money for boride research, not only because the borides retain a great part of their strength at temperatures over 2500 F, but also because they are composed of nonstrategic materials. Civilian uses appear to be in crucibles for melting metals, protector tubes for thermocouples, metal spray atomizing nozzles and electrical contacts. The recent decision by three firms—Carborundum Co., American Electro Metal Corp. and Firth Sterling Inc.—to join forces to expand activities of Borolite Corp. reflects these advantages. Borolite was formed to pursue research and development of various metal borides; its program will also cover carbides and aluminides for high-temperature applications.

THERMOCOUPLE PROTECTION— Iron-thermocouple protection tubes, used in aluminum and aluminum alloy baths are destroyed quickly by chemical attack of molten aluminum on the iron. Now an effective coating has been devised for protecting iron and steel so exposed. The coating, a co-operative venture of Barrows Porcelain Enamel Co. and Battelle Memorial Institute, is an improved glass-based enamel. It promises to be useful for similar applications in the zinc, lead, magnesium and chemical industries.

GRINDING TIP— Reserve grinding wheels and equipment for magnesium only. Grinding other metals on wheels used for magnesium brings up the sparking hazard. Operators also must wear leather or smooth, fire-retardant clothing and brush it frequently. Coarse textured or fuzzy clothing should be avoided.

PLASTIC PROSPECTS— How much of an inroad has plastics made into the tool and die field? Estimates range from 15 to 24 per cent, the Pressed Metal Institute was told at its fifth annual technical meeting in Cleveland. Auto and plane makers are the big users. Many, for example, make plastic and metal dies for the same job. The easily-modified plastic is used to work out design details and is put into production until the metal die is finished. Plastic draws like steel. If there is a tendency for breakdown at sharp radii, metal inserts are used for reinforcement. Since the metal floats in the plastic, there is no dissimilar metal problem. Runs of 60,000 are reported.

Metalworking Outlook—p.49 Market Outlook—p.137

No. 1 in **STEEL's** Modern Heat Treating Series

During the coming months, STEEL will present a series of articles to show you how modern heat treatment can help you save on materials and processing costs. Articles will feature latest technology of each process.

Let Modern Heat Treatment . . .

WITH THE heat on, costs turn down. Today's heat treating methods are doing just that for more and more manufacturers.

Most companies find labor and material costs are fixed or on the increase. At the same time, their customers are weighing their buying more closely. So the drive is on to reduce costs all along the line with no sacrifice in quality.

When heat treating is considered as one of the ways to trim costs, many are surprised at what they see. Technology has come up faster than they realized. New facts are known about exact conditions needed to produce a given property. Precise conditions can be maintained by factory men. Cheaper materials are in the offing. New equipment is highly mechanized. Properties once thought impossible are being achieved on both alloy and carbon steel.

Sales curve of the heat treating industry offers more proof of the growing importance management places on new heat treating furnaces and new ways of using them. Installations in 1953 were almost two and a half times above 1940's, figures of Industrial Furnace Manufacturers' Association show.

Selective Hardening — Concentrate heat, control temperature, confine hardness — these pointers have guided engineers in the development of induction and flame hardening equipment to condition the surface of steel to the hardness wanted and to put it exactly where it is needed.

Selective heat treating may make it possible to use leaner alloys and carbon steels. Sometimes, the manufacturer actually ends up with a better part by going to a lower hardenability steel. Example: Automobile crankshafts where it is important to get hardness on bearing surfaces for wear resistance and hardness in the fillets for fatigue resistance.

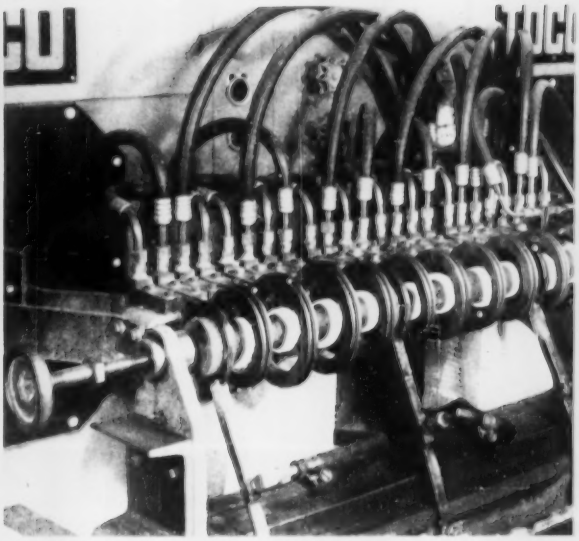
Or take gears. Here, the equivalent of a carburizing job is being done semiautomatically under close temperature control, using medium carbon steel. Result is high hardness on tooth profiles, necessary for wear resistance to obviate surface fatigue, while keeping high core strength for impact and fatigue resistance.

High Accuracy — Need for extreme accuracy is often a plus requirement. On a torque converter over-riding clutch cam, the heat patterns on the multiple internal cam faces must be held within close limits for depth and length. Piece itself must also retain its original geometry within 0.002-inch. Required production of 550 pieces an hour is obtained with one, three-spindle Cincinnati Milling Flamatic machine.

Take the case of a worm shaft (27½ inches long) formerly hardened by carburizing. Hardness is required only on the surface. Selective flame hardening took over the job. Several extra operations, including straightening, were eliminated. Part was made of plain carbon steel instead of an alloy grade.

Induction Steps In—Before induction heating, track pins were

Above is shown an automatic flame hardening unit used for hardening air cylinder piston rods six at a time



This Tocco induction heating machine is hardening a camshaft. Design used depends on production needed

TURN ON THE HEAT TO . . . TURN DOWN YOUR COSTS

By DR. ALLEN G. GRAY
Technical Editor

of alloy and carburized with the usual grinding and machining operations. Cheaper SAE 1050 steel of turned and polished mill stock is now used. Wearing surface of track links is also hardened by induction.

Trunnion cups are now hardened on the same automatic tool that does the machining. A patented Tocco inductor coil matched to one spindle of a multiple spindle, automatic screw machine heat treats the inside diameter of automotive trunnion cups after they have been completely formed on the same machine tool.

This method allows use of SAE 1144 steel and takes place of copper plating and carburizing. Product is improved from distortion standpoint and a grinding operation is eliminated. Heating and quenching cycles are about 10 seconds per part; production per machine is over 300 parts per hour.

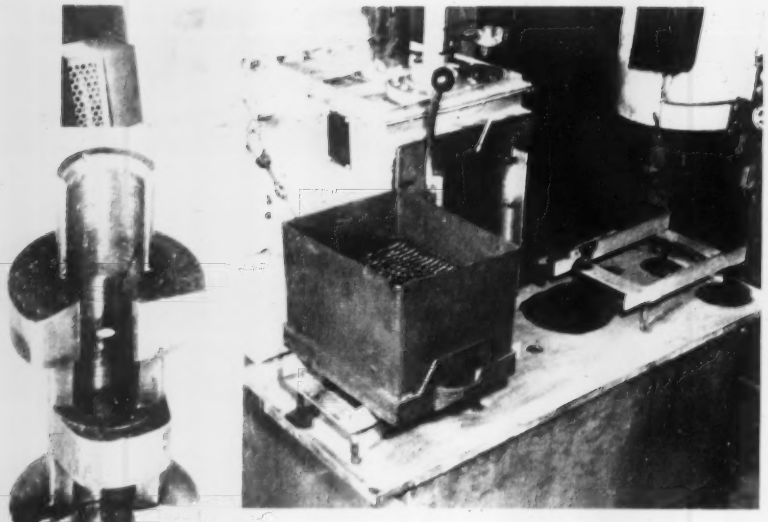
RF Too—Radio frequency type induction heaters are used for brazing, soldering, hardening and annealing. As the range of operating frequency increases, power output ratings tend to decrease; applications, in general, become increasingly specific.

Frequency of induced currents affects heating characteristics. Here are some figures from Allis-Chalmers: At a frequency of approximately 500 cycles current will penetrate steel about $\frac{1}{8}$ inch. At 500 kilocycles current penetration is about 0.0037 inch.

In one plant, soft soldering and brazing of thin (0.010-inch) phosphorus bronze discs are handled with a 25-kw induction heater. The thin discs are not burned or distorted and production rates are 300 per cent over the previous method.

Take Stock—If your atmosphere heat-treating equipment is 10 years old, it is obsolete. If it's 5 years old, it's time to see if a

Below is an installation of Lindberg controlled atmosphere belt conveyor furnaces which are used for bright hardening and austempering and martempering operations



These parts of 1117 steel are held at 1600°F for two hours in a L & N Homocarb furnace with carbon set point of 0.95 per cent; then they are oil quenched without exposure to air

Surface Combustion Corp.

Small parts shown above are formed of low carbon steel, then homogeneously carburized to various carbon levels to develop the required properties

modern process will save you money. Advice comes from Lindberg Engineering Co.

Look at carbonitriding, for instance. It adds carbon and nitrogen to steel. Compared with straight carburizing, the nitrogen lowers the critical point and increases hardenability. Result: Inexpensive low carbon C1010, C1020 or frequently screw stock, such as C1113, can be successfully hardened by an oil quench, even in fairly large sections.

Contrast — If straight carburizing were used, a drastic quench, such as water or brine, would be required for these unalloyed steels. Such quenches often give too much distortion, requiring alloy steels for oil quenching.

Carbonitriding even allows atmosphere quench and still gives hardness. Compared with oil quenching more than twice the furnace time is required. But where critical shapes must be case hardened without distortion, handling and straightening steps are saved.

Case in Point — Recently, an automotive company set up a process to carburize parts, then fixture quench in Gleason presses by oil. It was found that plain carbon steel would not consistently quench out in oil.

Cost of using an alloy steel or converting the Gleasons to water would have been considerable. Holcraft & Co. suggested adding ammonia to the furnace atmosphere. The small amount of nitrogen added was sufficient to increase the hardenability of the steel to where it would harden out in oil.

Modern atmosphere heat treating equipment turns out bright, scale-free work. This eliminates grinding and makes for easier inspection. For parts that are to be plated, pickling time is minimized. There is less possibility of hydrogen embrittlement.

Pay-Off—Investigation of heat treating paid off for the Keller Tool Co., Grand Haven, Mich., manufacturers of portable pneumatic tools. A pneumatic cylinder was formerly manufactured from air-hardened tool steel. Pickling to remove internal scale and a finish grinding to correct distortion were required.

Now a lower cost C-1117 cylinder is carbonitrided at saving of 25 cents a pound on raw materials. Annual savings were 50 per cent of the cost of the Ipsen furnace used.

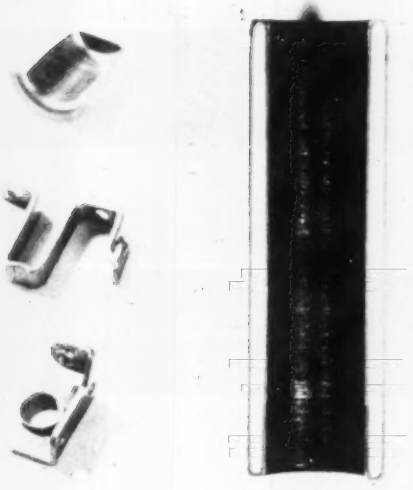
Better Control Gas carburizing has replaced pack carburizing for all piston pins at Chrysler Corp. Only change in materials was from AISI 1117, coarse grained stock to fine grained stock.

Besides eliminating two cyaniding and quenching operations, the gas carburizing method has another advantage: Analysis of carburizing atmosphere can be checked periodically and any necessary adjustment made.

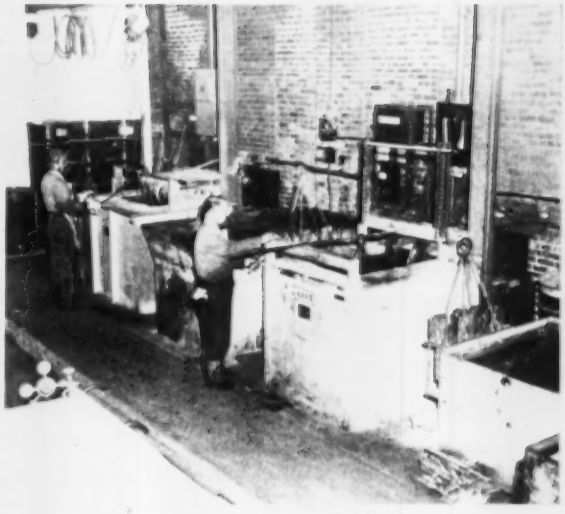
All The Way—Effective changes in material and processing specifications are being made with homogeneous carburizing. Process raises carbon content of a low carbon steel part to a medium or high carbon level throughout its entire section. A 1010 steel is modified to a 0.50 or 0.80 per cent carbon steel.

Economies result from ease of forming low carbon steel then imparting mechanical properties of high carbon steel. Surface Combustion Corp. says these savings are exploited by manufacturers of products ranging from cartridge cases to fasteners. Gages go up to $\frac{1}{4}$ inch.

Less Rejects—One plant homogeneously carburizes low carbon steel stampings rather than working 0.70 per cent carbon annealed sheet. Complicated stampings with sharp bends are formed without cracking. Savings come from eliminating rejects, and inspection, in addition to the cheaper steel. Stampings are quenched directly from furnace and are ready for tempering to spring properties.



Gas carburizing has replaced pack carburizing for piston pins on Chrysler Corp. cars and trucks. Shown is cross section of treated pin



Carbon steel is heated to 1550 F in Ajax salt bath, followed by brine quench and draw at 450 F. Gives hardness within one point of Rc 52

Another intricate, cold formed part was being fabricated from SAE 1050 steel. Today, it is press-formed of SAE 1010; and after homogeneous carburizing in a Leed's and Northrup furnace it has the same physical properties as the part made of SAE 1050.

Puts it Back — Carbon restoration permits use of such economical practices as thread rolling in the production of a quality bolt. If carbon restoration were not employed, it would mean the use of centerless ground stock or the removal of the decarburized skin of the stock prior to rolling the threads. Process is applicable to a wide variety of threaded parts.

From the mill standpoint, carbon restoration annealing permits upgrading of cold finished steel to a quality equal to centerless ground stock.

Hand in Hand — Atmospheres and quenches work together to solve problems in high production applications. Heat transfer of a clean surface is particularly important in the quench, where convection predominates in heat removal.

Dow Furnace Co. says a complete sealed cycle from heating to quench protects the hot oil itself and makes the interrupted quench no more difficult from operational standpoint than the more conventional quench at moderate temperatures.

Salts — Much activity centers around salt baths for interrupted quenching, where work is rapidly cooled to a selected temperature.

Three main operations are used: 1. Austempering, to give medium hardness, combined with ductility, toughness and good control of distortion. 2. Martempering, to give high hardness (equal to oil quenching) with reduced distortion and minimum internal stresses. 3. Cyclic annealing for soft, easily-controlled structure, with a short time cycle.

Light Sections—Austempering is used on relatively light sections, $\frac{1}{4}$ inch or less, where hardness requirements fall between 35 to 50 Rc, and where toughness or ability to bend without breaking after hardening is a requirement.

A manufacturer of lawn mowers uses austempered blades of SAE 1065 steel in place of more expensive material. Blades are austenitized at 1550° F for six minutes in one bath, quenched in a second salt bath at 475° F for six minutes, air cooled and washed.

Required hardness of Rc 48 to 52 is obtained. Blades are tough enough to mow nails and ductile enough to be bent into a horseshoe without cracking. One man can operate the mechanized Ajax line to produce 550 blades per hour.

More Alloy—In martempering, alloy steel or carburizing steel is the general rule. Compared with austempering, heavier sections can be treated. Many types of tools, gages and accurately finished parts with high stress or high hardness requirements are martempered.

Elimination of distortion is probably the greatest advantage of the process. Final grinding of heat treated parts is expensive and even a moderate reduction of the finish grind can off-set the cost of heat treatment.

More Savings — Distortion of SAE 4130 landing gear parts, when heated in oven furnace and oil quenched, was equivalent to $\frac{1}{4}$ inch.

A. F. Holden Co. has reported that by marquenching, total distortion on large sections was reduced to a maximum of 0.040-inch across the face of a thin and heavy section. This reduced the weight of the piece being heat treated and also the amount of subsequent machining.

Molten salt baths for carburizing are being refined. Activated carburizing baths of the original type have been largely replaced by compositions that are completely soluble in water after oil quenching.

DIAGNOSIS OF 274 TOOL HEADACHES

PART 2

Production of "useless part" gives researchers practical insight into workability of stainless steel

Machining of standard test part in automatic screw machines enables researchers to combine operations and approximate experience of average user

By J. D. ARMOUR
Chief Metallurgist
Union Drawn Steel Division
Republic Steel Corp.

This is the second of two articles on the subject by Mr. Armour. First, which appeared in the March 22 issue of STEEL, was a guide for machining stainless steels.

A PART that will never sell is paying off in a big way at Republic Steel Corp.'s laboratories. Its production (figures run into the hundreds of thousands) has made possible the development of complete machining data on about 200 currently-used types of steel including stainless.

By machining this "useless part" on standard, automatic screw machines, researchers have been able to arrive at practical measures of machinability; and in the process, they are given the opportunity of diagnosing and solving many of the day-to-day problems of machine tool men (see listing of machine tool troubles).

If, for example, a forming tool can't hold dimensions, Republic researchers have found that there are seven places to look for trouble: Loose spindles, too much dwell, dull tools, soft material, loose tool holders, too much feed, or dimensions may be too close to hold on a production machine.

Standard Test Chief purpose of using the automatic screw machine is to approximate the experience of the average machine tool user. The standardized test part gives full information on ten types of machining operations—rough form, finish form, shaving tool, cutoff, spot drill, large drill, small accelerated drill, counterbore and reamer, facing tool and tap.

Usually this procedure is followed: Stock is run for a few pieces at a speed and feed determined from previous experience with similar steel. Cutting action of different tools is observed; and the finish and temperature of the completed parts are noted.

With this start, feeds and speeds are changed until the best combination is reached. Balance of the test is carried out with this type of setup.

At intervals, piece being made is carefully examined to note how the finish from the different tools is holding up—occasionally, the machine is stopped and all tools are carefully examined for wear.

Test is continued until at least one regrind on the hardest work-

TROUBLES . . . encountered with tools most commonly used in cutting stainless steel

TURNING TOOL TROUBLES

Tools Heat and Burn

1. Turning tools may not be heavy enough.
2. They may be ground to resist cutting by not having the proper clearance and rake angle.
3. Tools may not have sufficient coolant at the right place or it may not be the proper coolant.

Build Up on Cutting Edge

1. Top rake angle may not be sufficient.
2. Not enough feed to keep build up from forming.
3. Tools not ground smoothly enough as a roughly ground surface will resist chip slide and the built up edge will have a chance to form.
4. The material that is being cut may be extremely soft.
5. Improper coolant or coolant not applied correctly.
6. Not enough speed.

Cannot Hold Close Dimensions

1. Feed too heavy.
2. Too much dwell.
3. Loose spindles or end play.
4. Loose tool holders or carriers.
5. Tools not ground properly.
6. Tools not sharp.
7. Dimensions too close to hold by production turning.
8. Parts get too hot while turning.
9. Improper coolant or not sufficient coolant at right places.

Cutting Edges Break Down

1. Tools may be ground too rough by using too coarse a grinding wheel.
2. Tools may be ground too thin without proper cutting edge support.
3. Too much feed.
4. Tools too soft—Decarburized surface.

Poor Surface Finish

1. The material that is being cut may be too soft.
2. Surface feed may be too slow.
3. Not enough or too heavy feed.
4. Loose spindles.
5. Too much end play in spindles.
6. Loose tool holders or tool slides.
7. Improperly ground tools.
8. Improper coolant or coolant not applied correctly.
9. Grain structure of material being cut.
10. Inclusions in steel.
11. Dull tools.
12. Tools ground rough.

Tool Drags

1. Tool holders warped or pounded out of shape.
2. Tools not ground with proper rake and clearances.
3. Tools cutting above center.

Work Hardened Surface

1. Tools cutting above center.
2. Dull tools.
3. Low feed.
4. Insufficient rake and clearances.
5. Loose holders.
6. Lands too wide.

Tools Dig

1. Tools cutting below center.
2. Not sufficient rake or clearance angles.
3. Hard and soft spots within the material being cut.
4. Loose spindles or end play.
5. Loose tool holders.

FORM TOOL TROUBLES

Tools Gall and Bind and Wear on Sides

1. Circular form tools which do not have any side clearances are the worst offenders, especially in deep forming.
2. Loose spindles or end play.
3. Worn out holders which do not hold tools squarely.
4. Soft material.
5. Insufficient feed.
6. Improper coolants and not applied correctly.
7. Tools too soft—decarburization.

Tools Burn

1. Tools lack sufficient rake and clearances.
2. Too much speed.
3. Improper coolant or coolant not applied correctly.
4. Not enough feed.
5. Material too hard or too soft.
6. Tools too dull.
7. Soft tools—decarburization.

Chatter Marks

1. Tools too sharp.
2. Loose spindles.
3. Too wide a cut.
4. Improper coolant or coolant not applied with sufficient pressure.
5. Loose tools.
6. Tools cutting below center.
7. Feeds too light.
8. Too much speed.
9. Soft material.

Cannot Hold Dimensions

1. Loose spindles.
2. Too much dwell.
3. Dull tools.

(continued on p. 108)

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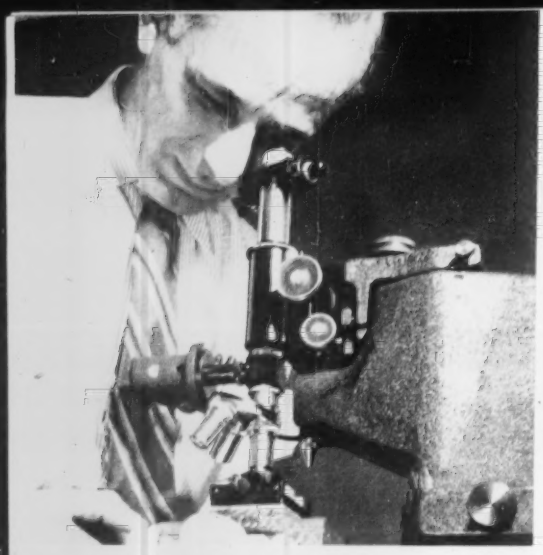
ing tools is necessary. A chronolog is attached to the machine. Reason for and duration of all down-time are exactly recorded (see accompanying photo).

On the Lookout Some special factors may be watched during the test. Chips are considered important, since the form they take affects machinability. Chip color is also watched carefully, since oxide formation is an indication of cutting temperature.

Chips may be subjected to further examination in a Tukon machine to test microhardness. Specimens may range from extremely thin sections to selected microscopic constituents.

Metallurgists consider hardness

Test data are accumulated on four special forms. The record here includes speed, feed, number of pieces, etc.



Special factors, such as microhardness, may be checked. Samples range from thin sections to micro constituents

and the way it is achieved. A sample heat treated to a given hardness might cause tool failure and lowered production, but the same sample annealed and cold drawn to the same hardness gives a satisfactory product for machining. Difference lies in structure.

Records—Data from the test are accumulated on four special forms. First covers the actual machining test. Record includes speed and feed used, number of pieces produced, elapsed time, condition of tools, tool grinding required, oil temperature, chip condition and other data that may develop.

Meanwhile, the second form is

TROUBLES . . .

4. Soft material.
5. Loose tool holders.
6. Too much feed.
7. Dimensions too close to hold on production machines.

Excessive Tool Wear

1. Material highly abrasive.
2. Not enough feed.
3. Not enough or too much speed.
4. Improper coolant or not applied correctly.
5. Soft tools—decarburization.

DRILLING AND TAPPING TROUBLES
Drills Break

1. Drills too long.
2. Dull drills.
3. Not enough clearance.
4. Too much speed.
5. Too much feed.
6. Loose drills.
7. Drills binding in hole especially on soft material.
8. Margin or land too wide.
9. Drills and material get too hot.
10. Improper coolant or coolant not applied correctly.
11. Drills do not line up.
12. Drills hit too hard.

Drills Break Up Center

1. Lack of lip clearance.
2. Heel not properly backed off.
3. Too much feed.

Drills Wear Down Rapidly

1. Tools too soft—decarburization.
2. Try nitriding or hard chrome plate.
3. Feed too light.
4. Too much speed.
5. Improper coolant or coolant not applied correctly.
6. Material too soft or too hard.
7. Material highly abrasive.
8. Drills do not line up.

Machine Ground Drills

1. Not backed off properly.
2. Web too wide.

Rough Finish

1. Soft material.
2. "Bugs" on land or margin.
3. Too much feed.
4. Loose spindles.
5. Soft drills—decarburization.
6. Improper coolant or coolant not applied correctly.
7. Poor chip elimination.
8. Too much twist in drills.
9. Loose spindles.
10. Loose drills.
11. Slow speed.

Drills Chipping or Breaking Down on Cutting Edge

1. Too much lip clearance.
2. Heel backed off too much.
3. Too much speed.
4. Too much feed.
5. Improper chip elimination.
6. Stopping machine while feed is on.
7. Material too hard or too soft.

Drills Squeak

1. Improper coolant or coolant not applied correctly.
2. Drills not lined up properly.
3. Material too hard.
4. Too much spindle speed.
5. Not enough feed.
6. Lands or margin too wide or worn away completely.
7. "Bugs" forming on margin.
8. Drills are too dull.

Tapped Hole Too Big

1. Oversize tap.
2. Wrong type of tap—commercial or precision.
3. Hole to be tapped too large.
4. "Bugs" on teeth.

Taps Overloading Due to Pickup

1. Improper coolant or coolant not applied correctly.
2. Material too soft.
3. Insufficient hook.
4. Rough grinding.
5. Lands too wide.
6. Chips packing in flutes.
7. Dull tap.
8. Material too soft.
9. Taps too soft—decarburization.

Tapped Holes Vary in Size

1. Check tap holder for proper float.
2. Material is too hard.
3. Work hardened hole.
4. "Bugs" forming on teeth of tap.

Rough Threads

1. Improper coolant or not applied correctly.
2. Material too soft.
3. Improper hook.
4. Roughness may be caused when tap is backing out—in this case back off heel.
5. Dull taps, not hard enough or decarburization.

Broken Teeth

1. Tap may be too hard.
2. Improper chip elimination.
3. Material too soft or too hard.
4. Improper hook angle.
5. Improper lead angle or chamfer.

TROUBLES IN CUTTING O.D. THREADS WITH DIE HEAD

Thin or Pulled Threads

1. Material too hard.
2. Die head not lined up.
3. Wrong lead on chasers.
4. Improper coolant or coolant not applied correctly.
5. Improper chamfer on part being threaded.

Rough Threads

1. Not sufficient hook.
2. Material too soft.
3. Too much speed.
4. Dirty coolant.
5. Improper coolant or coolant not applied correctly.
6. Too much face angle on chasers.
7. Proper dimension prior to threading.
8. Chasers not cutting evenly.
9. Chasers too soft—decarburization.

REVERE METALS

SERVE

Chris-Craft

STEM TO STERN

Bending a Revere Copper Tube for use in a Chris-Craft Cruiser. Revere Tube is also used in many Chris-Craft runabouts and utilities.

Chris-Craft cruisers are protected at the stem by brass stem bands. Revere supplies half-round extruded shapes for this decorative and protective application. At the stern or transom, copper exhaust tubes are just visible. There is a story behind these tubes, which have to be bent to shape with great accuracy, and without wrinkling. Chris-Craft Corporation's specifications are most exacting. The bending is done by a specialist, the Melville-Lee Co., located in Algonac, Mich., as is Chris-Craft. When Revere sought an order for the copper tube, the Technical Advisory Service was permitted to study Melville-Lee's equipment and methods, so our Methods Department at the mill could be thoroughly informed of the high quality requirements.

The tube required runs in sizes from 2" to 3½" OD. Use of copper tube reduces weight, while the corrosion-resisting qualities of copper make it durable and long lasting. Special standards of control over roundness, eccentricity and temper were set up in our mill, and production shipments have worked perfectly from the very beginning. No wrinkling or tearing has been encountered.

• • •

Revere Metals not only serve afloat, but in the air, under the sea, and on land, in almost every industry, including such diverse ones as the chemical, automotive, electrical and electronic, and in the home. Products include tube and pipe, rod and bar, sheet and plate, strip, extruded shapes, forgings, in copper and its alloys and aluminum alloys. Also Lock-seam Tube, electric welded steel tube. Get in touch with the nearest Sales Office.

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being prepared in the adjacent metallurgical lab. Here the record contains ladle and check analysis, grain size and structure of the steel including photomicrographs.

Tests also are made of mechanical properties of the lot, both in the hot rolled and cold drawn conditions. Data cover tensile strength, yield point, elongation, reduction of area, impact strength and hardness.

Third form is the hot mill practice report, which is a history of the steel from the beginning of its manufacture. Fourth form is a summary. It relates the results of the test in a brief paragraph.

Objective Republic's aim is to measure slight differences in machinability that occur in different lots of the same grade of steel, in addition to gross variations. Former may be caused by difference in microscopic structure, differences in steelmaking practice or by addition agents, such as aluminum, silicon, nitrogen, selenium, sulphur, etc. Short-time machinability tests are not sufficiently sensitive to measure these kinds of variables.

On a long-time test at Republic, a run on one lot of steel may take a minimum of 24 working hours; and thorough AISI-type tests take even longer. Usually about a ton of steel is consumed from each lot, and, in some cases, several heats are tested.

Testing also may be extended by experimental machining practice to determine the best feed and speed.

Dividends Machining the "useless part" has been rewarding in many ways. Effects of hot mill practice and cold finishing procedure on machinability have been studied. New steels with higher machinability have been developed. And information has been gathered that enables machine tool users to get maximum results from their equipment and steels.

MILLING TROUBLES

Cutter Hogs In

1. Too much speed.
2. Material too soft.
3. Too much rake angle.
4. Loose work table.
5. Improper coolant.
6. Not enough feed.
7. Loose spindles.

Excessive Vibration

1. Too much speed.
2. Too much rake angle or rubbing.
3. Material too soft.
4. Material too hard.
5. Cutter not cutting steady—fly wheel should be applied to cutter arbor.
6. Loose spindles on work table.

Cutter Wear

1. Too much speed.
2. Not enough feed.
3. Improper coolant or coolant not applied correctly.
4. Loose spindles.
5. Too much land.
6. Not enough rake angle.
7. Abrasive material.
8. Material too soft.
9. Soft cutters—decarburization.

Cutter "Bugs Up" and Burns

1. Improper coolant or coolant not applied correctly.
2. Soft material.
3. Too much speed.
4. Not enough feed.
5. Hook and clearance angle not right.
6. Too much land.

Cutter Burnishes Surface

1. Too much speed.
2. Not enough feed.
3. Lands too wide.
4. Loose spindles.
5. Hook and clearance angles not correct.
6. Work table too loose.
7. Material too hard.

BROACHING TROUBLES

Poor Finishes

1. Soft material.
2. Improper rake angle and not sufficient slide or slip clearance.
3. Improper alignment of broach.
4. Improper coolant or coolant not applied correctly.
5. Poor chip elimination.

Tooth Breakage

1. Soft material.
2. Too much rake angle.
3. Teeth too thin.
4. Broach puller out of alignment—check center of axis of broach with axis of face plate, as these must be in line.

Drifting

1. Check center of hole so it is in line with center of broach.

Excessive Wear on Teeth

1. Abrasive material.
2. Broach drifting.
3. Improper coolant or coolant not applied correctly.
4. Part being broached gets too hot.

Chatter

1. Pulling broach too fast.
2. Teeth too sharp—hone.
3. Parts not held tight enough.
4. Load per tooth too great.
5. Improper coolant or coolant not applied correctly.

Parts Will Not Hold Size

1. Parts not held securely.
2. Parts too weak may spring out of shape.
3. Improper coolant.

Tearing

1. Soft material.
2. Not enough hook.
3. Improper coolant.
4. Not sufficient slide or slip clearance.

REAMING TROUBLES

Rough Finish

1. Too much speed.
2. Too much feed.
3. Not enough feed.
4. "Bugging" of lands.
5. Lands too wide.
6. Material too soft.
7. Dull reamers.
8. Poor chip disposal.
9. Improper coolant or coolant not applied correctly.

Chatter

1. Too much speed.
2. Loose spindles.
3. Not enough feed.
4. Improper coolant or pressure.
5. Lands too narrow.
6. Not enough stock left for reaming, or too much.
7. Possibly a special reamer should be used.

Burnished Surface

1. Not sufficient stock to remove.
2. Surface prior to reaming was work hardened.
3. Material too hard.
4. Lands too wide.
5. Too much speed.
6. Not enough feed.
7. Improper coolant or coolant not applied correctly.

Tool Marks

1. Reamer too roughly ground.
2. Too coarse or too fine a feed.
3. Soft material.
4. "Bugs" on lands.
5. Lands too wide.
6. Speed too slow.

Reamer Binds

1. Too much land.
2. Not enough feed.
3. Too little to ream out.
4. Improper coolant or coolant not applied correctly.
5. Reamer not properly backed off.

Parts made of tough ANACONDA Phosphor Bronze wear better, last longer

Ten alloys are available in sheets, plates, strips, wire, rods, bars and seamless tubes.

Constant wear and flexings. Periodic stresses. Fatigue and corrosion. These are the things that can knock machine parts out of commission. But they can't hurt those shown above.

Here's why. All of them are made of ANACONDA Phosphor Bronze Alloys. And these copper-tin alloys are strong and tough. They are non-magnetic. They conduct heat and electricity well. And you can work them easily.

In bushings, gears and bearings Phosphor Bronze doggedly resists abrasion. In switches, springs, diaphragms and electrical contacts it keeps its high elasticity under conditions where less rugged alloys fail.

ANACONDA Phosphor Bronze comes in 10 standard compositions (including a free-cutting alloy). Tin content ranges from 1.25% to 10.0%.

Quality? Our record speaks for itself—a recent study of sheet metal covering two years' production shows that claimed unsuitable quality was at the amazingly low ratio of 400 pounds per million pounds shipped.

Tell us what you make and how it's used. We'll help you select the correct Phosphor Bronze Alloy. *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.*

ANACONDA
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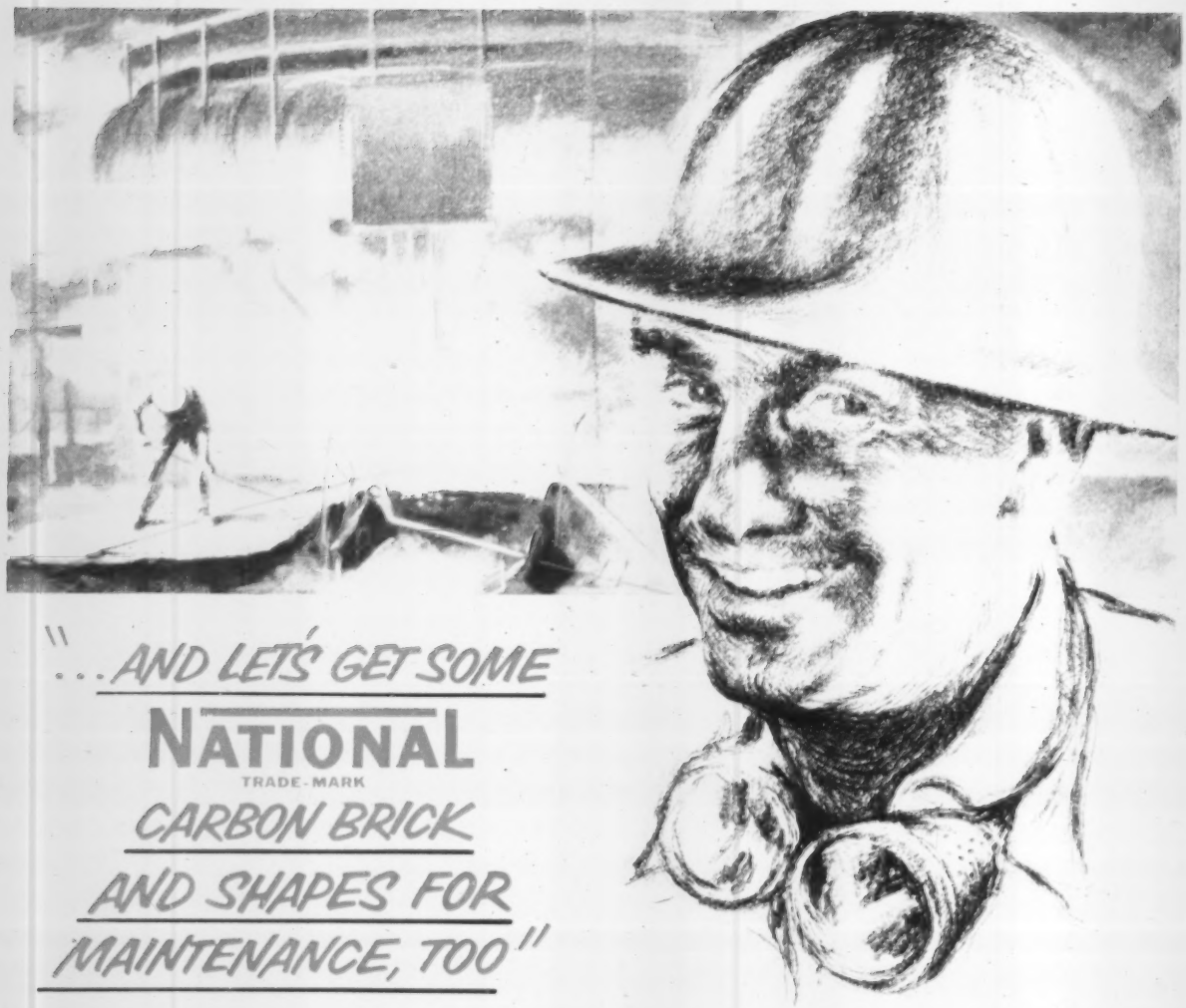
Sheets • Plates • Strips • Wire • Rods
Bars • Seamless Tubes • Special Shapes



"...AND LET'S GET SOME

NATIONAL

TRADE-MARK

CARBON BRICK AND SHAPES FOR MAINTENANCE, TOO"

WHEREVER HOT METAL HITS, refractories take a beating. This is true *around* a blast furnace, as well as *in* it. That's why more and more operators are applying the lessons learned in *lining* blast furnaces to maintenance of *other* hot metal areas.

KEEP THESE STANDARD SIZES ON HAND FOR EMERGENCY!

13½" x 6" x 3" series
9" x 6" x 3" series
9" x 4½" x 2½" series

★

Write for Catalog Section S-6210

EXPERIENCE HAS PROVED the contributions of "National" carbon and graphite to better production, longer life and lowest maintenance-cost-per-ton in these and other applications:

- RUNOUT TROUGHS
- CINDER NOTCH LINERS
- CINDER NOTCH PLUGS
- MOLD PLUGS
- BEDS AND TRAYS
- SPLASH PLATES
- STOOL INSERTS
- CORES
- SKIMMER PLATES

The term "National" is a registered trade-mark of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
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District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
IN CANADA: Union Carbide Canada Limited, Toronto

Coating is dull mat battleship grey. Any oil-base paint can be applied over it for decorative purposes

ZINC-RICH COMPOUNDS Give Cathodic Protection

By H. L. GREBINAR
Galvicon Corp.
New York

Coating can be brushed, sprayed or dipped. Using vinyl resins as binders, they contain 96 per cent zinc by weight when dry. Coating discontinuities are not a problem here

YOU can give iron or steel cathodic protection against corrosion by coating it with vinyl resins heavily saturated with zinc powder.

Coating (which also acts as a barrier against corrosion) is anodic. Being electropositive, it suffers corrosion while protecting the electronegative base metal. Zinc is higher in the electromotive series than iron.

Compound is brushed, sprayed or dipped. Two spray coats equal one brush coat in thickness. Viscosity for dipping is about midway between the brush and spray coat.

Pros and Cons—Surfaces can be treated at any time during manufacture or installation. Surface preparation is minimal. And although the coating costs more than most base-coat paints, its promise of longer life is a potential saving.

Two limitations: Vinyl resin bonding media is affected by chlorinated hydrocarbons and petroleum solvents; and coatings should be given 48 hours to dry.

Normal air drying takes about 10 minutes, but two days is needed for complete evaporation of solvents and the setting up of galvanic action. So the coating cannot be put under severe abrasive conditions soon after application. Complete aging depends upon moisture in the air. Longer the coating is exposed to atmospheric conditions or salt water immersion, the harder it becomes.

Background — J. E. O. Mayne, British expert on corrosion, says that this type coating must "contain metallic zinc power in sufficient quantity (about 95 per cent after drying) for pigment particles to be in contact with each other . . . and confer cathodic protection."

Mr. Mayne coated steel plates with the zinc-rich compound, pierced them with a scratch line and placed them in sea water. They showed no evidence of loose rust after two years. Even after the electrical connection between zinc and steel ceased, protection continued through the formation of zinc hydroxide, which had been deposited on the exposed steel as a cathodic product.

Tests—Galvicon, product of Galvicon Corp., is talked of as a cold galvanizing compound rather than a paint. Here are test results:

Salt spray—coating was sprayed for 600 hours with a 20 per cent salt solution kept at 95° in a chamber. Results: Coated steel showed

better protection than any other form of treated steel.

Electrolytic effect on rusted panel—coating was applied to a rusted panel and air dried 48 hours. Then it was immersed in a 20 per cent salt solution for 24 hours. Results: Action of zinc on iron oxide produced a rust of an adherent and protective nature.

Adhesion-bond test—22-gage steel was coated ½ ounce per square foot. Specimens dried for 12 hours, then bent through 180 degrees on a ¼-inch radius. Results: Adhesion on outside of bend was perfect, with no flaking.

Humidity test—panels were exposed in relative humidity of 100 per cent at 140 F. Twenty-one cycles, of 6 hours each, were carried out. Results: Little or no change apparent on the surface, with no sign that the coating was lifting or breaking down.

BSI copper sulphate test—Pieces of bright steel were coated about ½ oz per sq ft and immersed for seven 1-minute periods in a $CuSO_4$ solution at 149 F. Results: No surface breakdown apparent.

Purity — Galvicon Corp. found that chemical and physical properties of the zinc are of primary importance. Zinc must be as pure as possible and completely free from lead.

They found that the finest particle size available from commercial producers was about 7 times greater than that necessary for a smooth, uniform coating. So a microgrinding process is used.

Specifications—When dry, Galvicon has a zinc content of 96 per cent by weight. It affords protection against dilute acids and vapors, solutions of inorganic salts, humidity, sea water, fresh water and salt atmospheres.

Coating, which is dull mat battleship grey, leaves a surface that is medium hard and flexible. It will resist temperatures up to 350 F, and its adhesion, which is good, improves with age. At brushing consistency, it will cover 625 sq ft per gallon—one coat gives a protective coating about 0.0009 inch thick.

Applications Unlimited—Coating can be applied to any iron or steel surface subject to corrosion. It can be used as a prime coat or a self finish. Any standard oil-base paint can be applied over it for decorative purposes.

How To—In preparing surfaces, be sure they are free from grease, oil, loose rust and moisture. Scratch adhering rust with a wire brush to establish bare metal to act as an anchor for the coating over the rusted surface.

Compound must be stirred thoroughly until there is a definite grayish appearance that denotes even dispersion of zinc. Mixture should be agitated occasionally, to obtain a uniform coating.

Apply with a clean, soft-bristle brush, well loaded with the medium. Work with the compound as near the bottom of the can as possible. Zinc has a tendency to settle. A full brush of compound is needed for even distribution. Brush rapidly, particularly at temperatures about 80 F. If an additional coat is used, allow 2 hours between coats.

After surface is tack free, splash water on the coating. Water acts as an electrolyte and hastens the galvanic action. It also helps detect thin spots in the coating. If minute traces of rust appear within 24 to 48 hours after washing, retouch faulty work.

Coating also may be sprayed or dipped. For spraying, suggested dilution is 100 per cent by volume with the solvent. Use a spray gun with an agitator developing pressure between 60 to 85 psi, using 4 or 5 nozzles. For dipping, it is suggested that brushing compound should be diluted in ratio of one part solvent to two parts compound. Mixture requires agitation system.

Corrosion of Iron and a Second Metal in Electrical Contact and Totally Immersed in 1 Per Cent NaCl

Second Metal	Iron-corrosion in mg.	Corrosion of second metal in mg.
Magnesium	0.0	3104.3
Zinc	0.4	688.0
Cadmium	0.4	307.9
Aluminum	9.8	105.9
Antimony	153.1	13.8
Tungsten	176.0	5.2
Lead	183.2	3.6
Tin	171.1	2.5
Nickel	181.1	0.2
Copper	183.1	0.0

Note: Degree electropositive metal corrodes is directly proportional to the current flowing between it and the iron or steel. Zinc is topped by only magnesium in cathodic protection, but magnesium is difficult to apply and its galvanic function is hampered by an insulating oxide film.

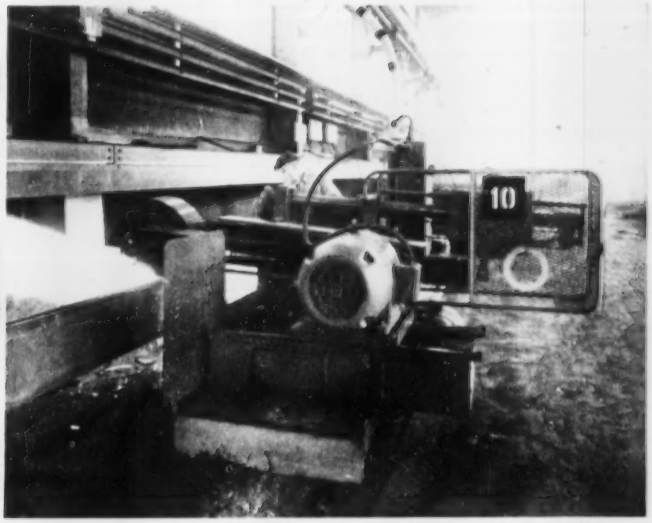
Paints, Anodic and Cathodic Metallic Coatings

Use of paint as a coating is based on the principle that air and moisture are isolated from the base metal. However, where these coatings are scratched, etched or broken, corrosion is likely to set in with serious damage to the metal itself.

Where iron is the anode and the coating is the cathode, conditions must be maintained to prevent discontinuities in the presence of an electrolyte. Any gap or pin hole will cause the iron to be sacrificed preferentially to the coating, with resultant pitting and blistering. If not properly applied and maintained, cathodic coatings may cause greater corrosion than no coating at all.

Where iron is the cathode and the coating the anode, the coating sacrifices itself for the protection of the base metal. Zinc coatings throw down a film precipitate in the cathodic zone. Film gives protection because iron salts formed will be precipitated by zinc hydroxide (in the presence of oxygen) as a clinging protective form of rust. Even though scratches and gaps occur, exposed iron escapes attack primarily because it is the cathode of the cell zinc-iron.

Portion of the grinding line at Rotary illustrates the over-all improvement over similar swing grinder installations. Striped lines are the trolley power take-offs



Closeup of the machine shows details of the reciprocating mechanism that moves the grinder across the slab face as the entire machine moves parallel to its length

TAKE THE STRAIN . . . out of slab grinding

That's what Rotary Steel did when they installed a battery of electric, hydraulically-controlled grinders. Trebled output, other savings overshadow higher machine costs

CHECK off one more back-breaking job that's on its way out of the steelmaking picture.

Grinding the rolled-in scale and imperfections from slabs of stainless or special steels prior to the finish rolling is ordinarily done by teams of men, each man guiding a large, unwieldy swing grinder. But a new line of grinding machines at Rotary Electric Steel Co., Detroit, takes the manual labor out of the job and makes it safer and faster.

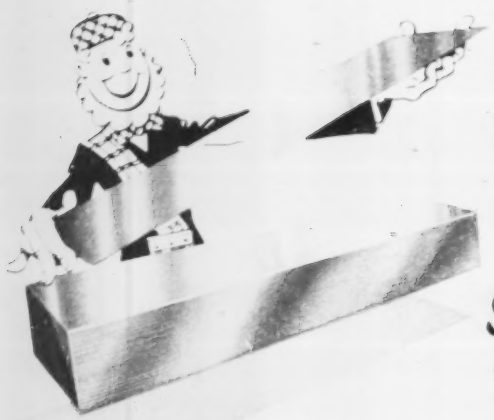
Other Plusses—The new grinding bay at Rotary has fourteen of the machines in operation. Designed by Mid-West Abrasive Co., Owosso, Mich., the machines are track-mounted and can move the entire length of the slab while grinding.

Due to the rigid control of wheel pressure and position, machine uses less grinding wheels for a given output than the swing grinder. At the same time, one machine is grinding three times as much surface per unit of time and doing it with much smaller metal losses.

Dangers resulting from wheel failure are greatly minimized in the new machine because the operator is protected by the cab construction. Furthermore, because control of the wheel is so positive there is less likelihood that dangerous, deep cuts will be taken.

Edges Too — Difficult job of grinding edges of slabs poses no problems for the machine. Controlled stroke mechanism allows the abrasive wheel to be positioned directly over the steel slab edge.

To maintain a uniform grinding pressure, as selected by the operator, a counter-balancing mechanism is designed to regulate the vertical forces on the spindle and control shaft. As the abrasive wheel is moved away from the operator, causing an increase in the pressure



"HOW MANY POUNDS IN A STAINLESS SHEET?"

When sheets are ordered by gauge number, permissible A.I.S.I. thickness variation is plus or minus 10%. Thus, if you order standard 18 gauge 36"x120" stainless sheets you may receive .052" thickness—while your job might actually require about .0475". And in the matter of weight, the theoretical weight of this same standard sheet is 63.00 pounds—but it may permissibly vary between 59.22 and 65.52 pounds. Remember, you purchase sheets *by weight*.

MicroRold Stainless may be ordered rolled to the "light side" of the gauge range. MicroRold Stainless may be held within a 3% tolerance—with such micro-accuracy that you are assured constant uniformity throughout your sheet or strip. And since each one-thousandth inch saved in thickness saves 1.26 pounds per sheet, MicroRold's amazing thinness control may well save you money.

Ask your steel warehouse distributor about MicroRold Stainless.

Washington Steel CORPORATION

WASHINGTON, PENNSYLVANIA

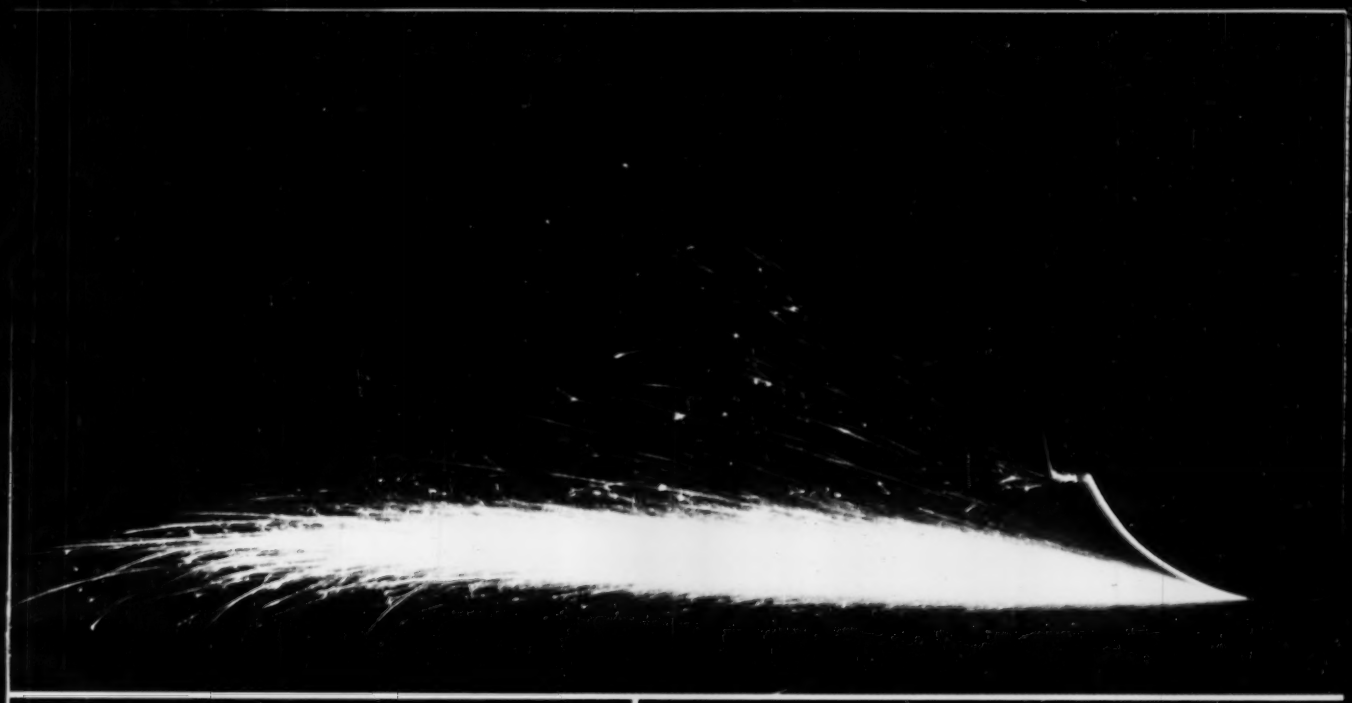
Note the difference in grinding patterns when the new grinder is used. Irregular marks on lower photo often indicate an excessive metal removal, common in manual swing grinding

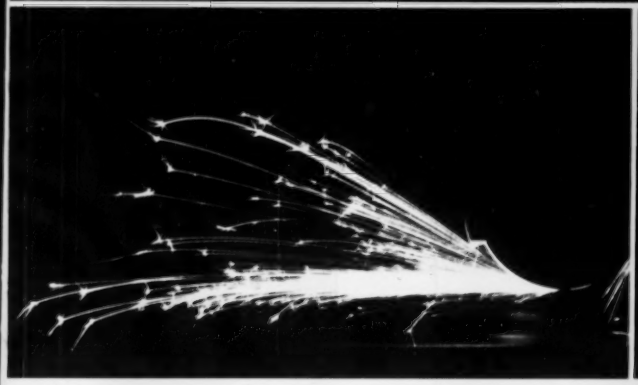
moment, a weight located on the slide arm is moved in the opposite direction to create a bending moment on the shaft in the opposite direction.

Hydraulic Motions — All of the positioning motions—raising, lowering, tilting and reciprocating—are accomplished hydraulically from controls at the operator's station. Machine mounts a 20 by 2½-inch abrasive wheel, belt-connected to a 20-hp motor; and it has a reciprocating grinding stroke of 42 inches, perpendicular to the machine's running track. However, the machine will take a 24-inch wheel, and the stroke can be lengthened beyond the 42 inches. Wheel speed is about 10,500 fpm.

Besides this new grinding bay, Rotary still operates a battery of swing grinders. Operators for the new line were chosen on the basis of seniority, since grinders were eager to operate the less-fatiguing new machines.

Though the new machines represent a capital investment many times that of swing grinders, Rotary feels that the trebled output plus savings on grinding wheels and greater safety factor more than offset the higher cost.





Every little spark stream has a meaning all its own

Upper photo, HIGH CARBON STEEL — lower left, TITANIUM — lower right, HI SPEED STEEL

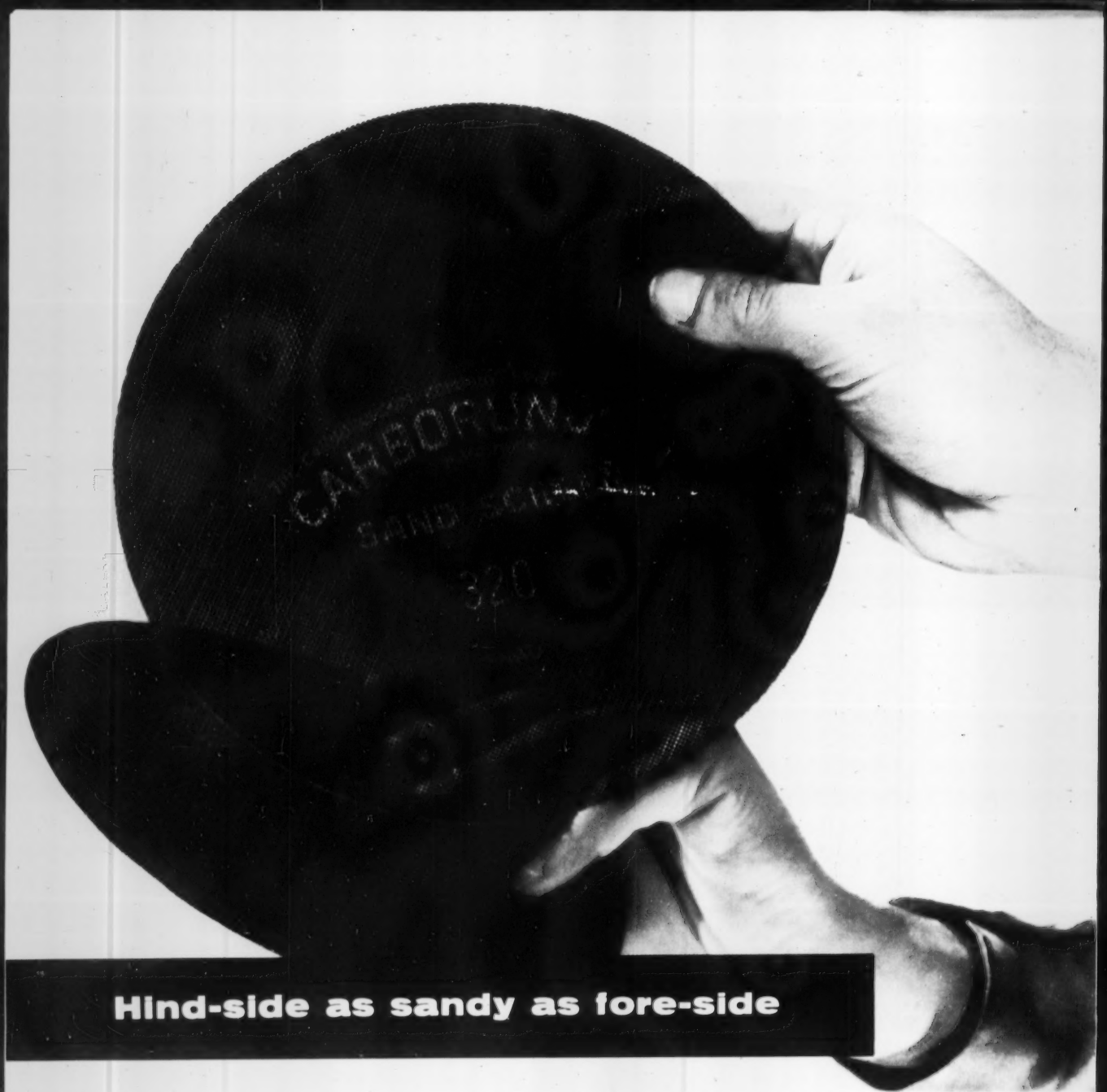
Touch a grinding wheel to a bar or billet, and a trained spark-tester can tell you what the metal is—even what the alloy is—by observing the spark pattern. Many companies use this method to double check the metals used in manufacture. It is one thing to choose a grinding wheel for spark testing—quite another to choose one for production grinding. The spark stream from your grinding machine tells a different story—a *profit* story—when you use grinding wheels by CARBORUNDUM. Profitable grinding is possible only with the wheel that suits your production demands, your machine, your operator. Making *sure* you get the right wheel for every purpose is a cardinal rule at CARBORUNDUM. For proof, call your Distributor or Salesman today.

Through application "know-how" and product quality

CARBORUNDUM

REGISTERED TRADE MARK

continually puts more **sense** in your abrasive **dollar**



Hind-side as sandy as fore-side

Use *both* sides of SAND SCREEN for sanding and finishing ... do from 7 to 15 times more work with one sheet or disc than you can with conventional coated abrasives. Removed material flows through the open mesh—you sand faster, longer, with much less loading. Use SAND SCREEN wet or dry ... for hand or machine finishing. Fold it—tear it to any convenient size. CARBORUNDUM'S SAND SCREEN Discs and FASTCUT Pad 85 Assembly slash time and costs on wet sanding of prime coats. On many operations of sanding flats and slight contours, no adhesives are necessary. Cut sheets fit oscillating or vibrating sanders ... do a terrific job wherever loading and glazing is a problem. Get samples today from your CARBORUNDUM Distributor or Salesman.

Through product quality and application "know-how"

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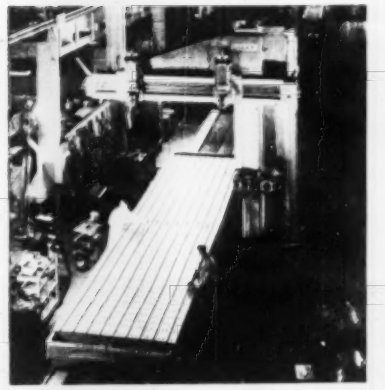


Giant Openside Planer

A giant machine tool, 120 x 108 inches x 30 feet has been completed by G. A. Gray Co., Cincinnati. It weighs in excess of 284,000 pounds and required six freight cars to ship it to the West Coast. The planer took two years to build

Program of Progress

The first sheet steel has been rolled at Pittsburgh Steel Co.'s new four-stand tandem cold rolling mill at Allenport, Pennsylvania.

Sheet steel for automobile bodies, electric appliances, building materials and thousands of other applications began emerging from the mill as operations began. The mill embodies the latest technical development in mechanical and electrical design and construction.

Scope—The tandem mill, together with other processing equipment for annealing sheet steel, a four high temper mill, two flying shear lines for cutting sheets to length, a slitting line for cutting the sheet to narrow widths and packaging and shipping facilities, is the largest installation of this type to be built in the Pittsburgh district for 15 years. The start of the mill marks the entry of Pittsburgh Steel into the market for cold rolled sheets. The sheets produced on the mill will range from 20 inches to 60 inches wide, and from 12-gage to 28-gage in thickness.

The expansion into flat rolled products in addition to the company's output of wire and wire products and seamless tubular products has been accomplished under a 4-year $65 million progress program.

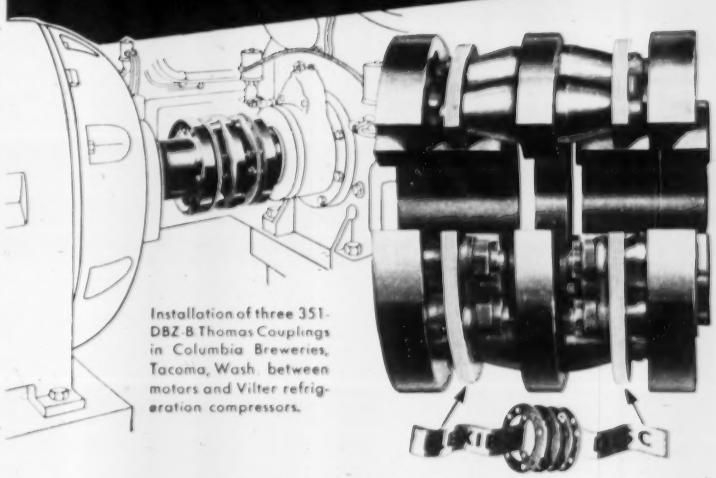
Models Aid In Research

Scale models are helping speed development of atomic power.

Atkins & Merril Inc., Sudbury, Mass., makes models of several of the Atomic Energy Commission's more important development projects. Scale models make it possible for scientists, engineers, designers, and contractors to visualize in three dimensions the total or any part of a complicated project before actual construction begins. Savings in engineering, drafting, design, construction, training, etc. are sure to follow.

Atkins & Merril makes the models to accurate scale. Materials used are wood, plastic and metals specially formed, machined or molded to the purpose by skilled technicians. A complicated atomic or industrial scale model may take 2000 or more man hours to build. The models are generally recognized by industry and the armed forces as a simple and fast way to instruct and train installation and operating personnel.

THOMAS FLEXIBLE COUPLINGS...
for more years of better service!



Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

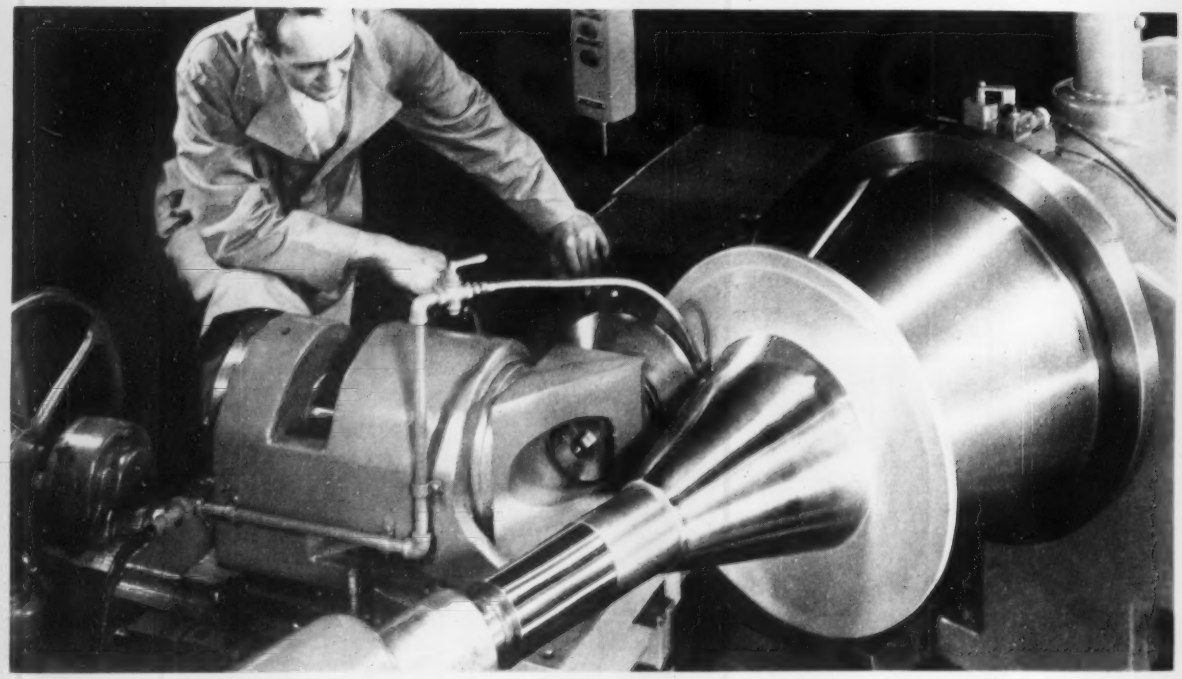
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating
NO LUBRICATION	No Wearing Parts. Freedom from Shut downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

THOMAS COUPLINGS ARE MADE FOR A WIDE RANGE OF SPEEDS, HORSEPOWER AND SHAFT SIZES.

Write for our new Engineering Catalog No. 51A

THOMAS

THOMAS FLEXIBLE COUPLING COMPANY
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.



Roll forming a jet engine exhaust cone. Diameter of the blank does not change as roller cold-flows metal to shape of mandrel on lathe spindle

New Tool For Roll Forming

Using heavy pressures, steel rolls cold-flow metal back along a mandrel. Wall thickness of part is reduced from that of the blank. High tensile strength is one advantage

STARTING as a forging with a weight of 369 pounds, a finished workpiece wound up a trim 50 pounds. Estimated cost of the forging was $276.75. Using a new metal-forming technique, the blank weighed 65 pounds and cost just $18.75. Savings in material alone were $228 or 82½ per cent.

Just announced by Lodge & Shipley Co., Cincinnati, the new metal-forming process is called Floturn. The method forms metal with heavy pressure applied to a rotating workpiece. It causes the metal to flow in a cold state.

How It Goes—Using a hardened and polished roller, the pressure is applied in a continuous spiral manner, gradually and accurately flowing a metal blank to the shape of a mandrel.

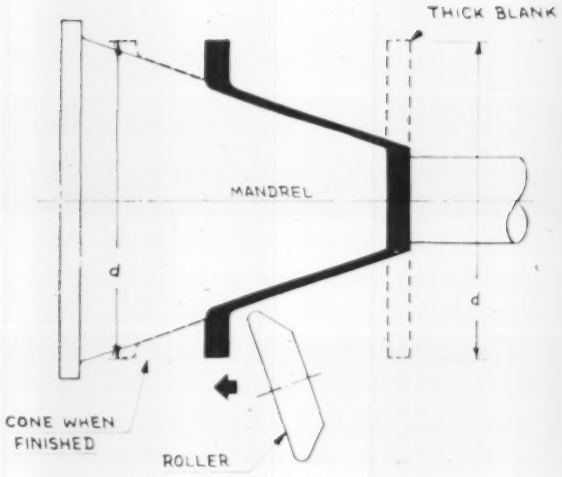
Conical, cylindrical, combinations of the two, and other complex shapes are easily formed. Process starts with a simple flat blank, machined blank, machined forging, drawn cup, wrapped and welded cylinder or a centrifugal casting. In many cases, with a single pass, the part can be finished.

Not Related — While Floturning resembles metal spinning, the two processes differ basically. In spinning, a blank considerably larger than the finished piece is used. Using moderate pressure, the metal is folded back onto the mandrel and the metal is rarely thinned.

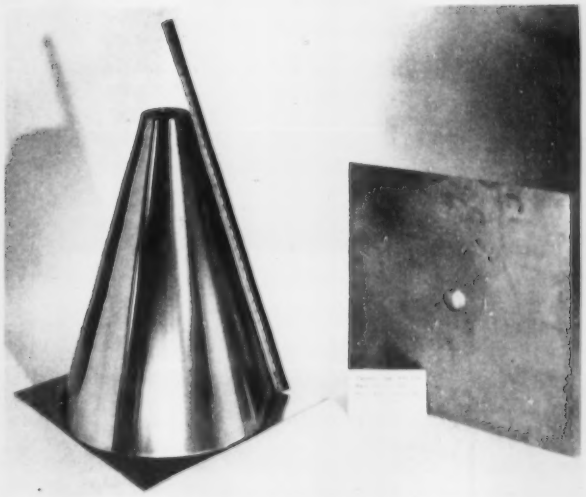
In the Floturn method diameter of the blank is exactly that of the finished part. Thickness is heavier than required in the finished wall. Additional metal flows into the extended shape. Machine controls the operations and all pieces are uniform. Dimensions can be held to ±0.002-inch.

Pretested — Process already has been checked and used in jet aircraft engine production. New alloys, including many considered hard to machine, can be Floturned. Among metals successfully formed are: All 300 and 400 series stainless steels, Timken 16-25-6 and 17-225, Haynes Multimet, Universal Cyclops Uniloy 19-9, Inconel and Inconel X, Monel and K-Monel, titanium Ti-140-A, copper and aluminum, as well as mild steel.

Physicals—Cold working of the metal also improves the tensile strength and hardness. Tests on 302 annealed, cold-rolled stainless steel showed tensile strength increased as much as 100 per cent. Hardness increased to between 57 and 59 R_{60N}.



Process forms metal like this . . .



To get shapes like this cone . . .

Flanges can be left at open end of the cone by stopping roll carriage. Flange thickness will be the same as that of the original blank. Shape of the blank, (round, square, etc.) determines the shape of the flange.

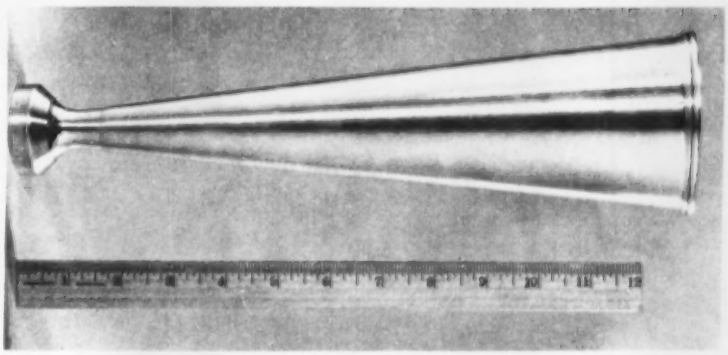
Limits — Wall thickness reductions up to 75 per cent have been achieved in one pass. The No. 40 Floturn lathe will form shapes up to 42 inches in diameter. Blanks of the harder metals may be worked up to 5/16-inch thick.

It is not generally recommended to form a flat blank into a cone with less than 30 degrees included angle in one pass. For these shapes the blank should be preformed by an additional pass, machining, or press forming.

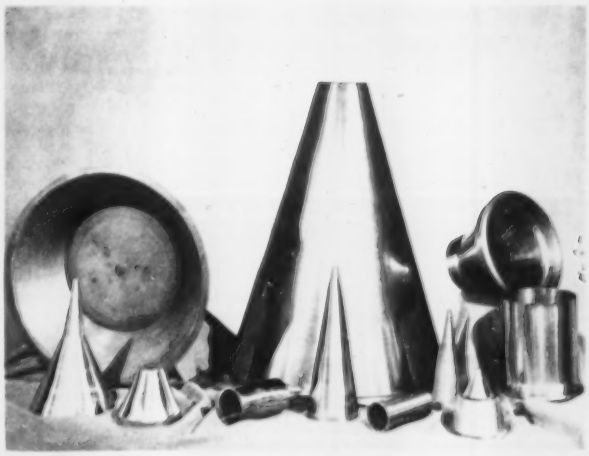
Equipment—Mandrels are generally hardened and ground tool steel. Pressure roller is high-speed steel, also hardened and ground. Rolls are 10 or 12-inch diameter with a small radius (1/16 to 3/4-inch) at one edge of the periphery and a beveled face.

A lubricant is flowed onto the work at the point of roll contact. While it seems the choice of lubricant is not critical, finish and performance are improved when using a lubricant, as opposed to dry forming.

Speeds and feeds vary with the metal being worked and the shape and size of the workpiece.



Or this nozzle (in 3 operations) . . .



Or any of these varied parts

Protective Relay Installed

PROTECTIVE relay equipment was recently installed on a 132-kv line of the Appalachian Electric Power Co. in Virginia. General Electric manufactured the equipment.

With the new equipment the maximum response time to any faulty condition occurring on the protected line is one cycle of system frequency (0.0167 seconds on a 60-cycle system). Circuit breaker tripping at both ends of the line is initiated within this time after the fault has occurred. The fault clearing time is reduced with the equipment, the system's stability is increased and larger amounts of power to be transmitted over lines than previously possible is allowed.

The equipment can be applied on three terminal lines or on very long lines where fault currents can be less than load current. The single carrier channel which is required for blocking of tripping during external fault conditions can be used concurrently for telephone and other extra functions.

TRANSMISSION LINE PROTECTED
. . . to be used on 330-kv system

Composition—Composed entirely of electronic circuits, the inherent handicap of mechanical inertia of electromagnetic relays is eliminated in the new equipment. Functions of the individual units parallel those of conventional relays in directional comparison relaying equipment. Electronic measurement of the power line ac current and voltage relationships provides relay operating characteristics of well-known form.

GE engineers add that because of the types of circuits employed, the speed of response to faults is essentially independent of the magnitude or location of the fault as contrasted with the much slower response of electromagnetic relays to low magnitude faults at distant points on the protected line.

Plans are to use the relay equipment on the lines of the Ohio Power Co.'s new 330-kv transmission system.

Inspecting Cylinder Bores

An air gage is reported to be a quick and easy way to inspect squareness of an automobile cylinder bore with the axis of the crankshaft bore. Sheffield Corp., Dayton, O., developed the gage.

It consists of a chrome-plated gaging spindle connected to a four-column Precisionaire and a cylindrical bar for locating the axis of the crankshaft bore. The gaging spindle has two sets of Balljet gaging contacts along its length for checking squareness and two Balljets in vee end to indicate when the spindle is properly positioned on the axis locating bar.

ARDCOR *Engineered*

MEANS BETTER COLD-ROLL FORMING

The Production-WISE
ROLL FORMING MACHINE

ARDCOR
MODEL 1-F

Spindle Diameter	1½"
Roll Diameter	4¼" to 7"
Horizontal Distance Between Spindles	12"
Roll Space on Standard Machine	10"
Capacity Max.	.072

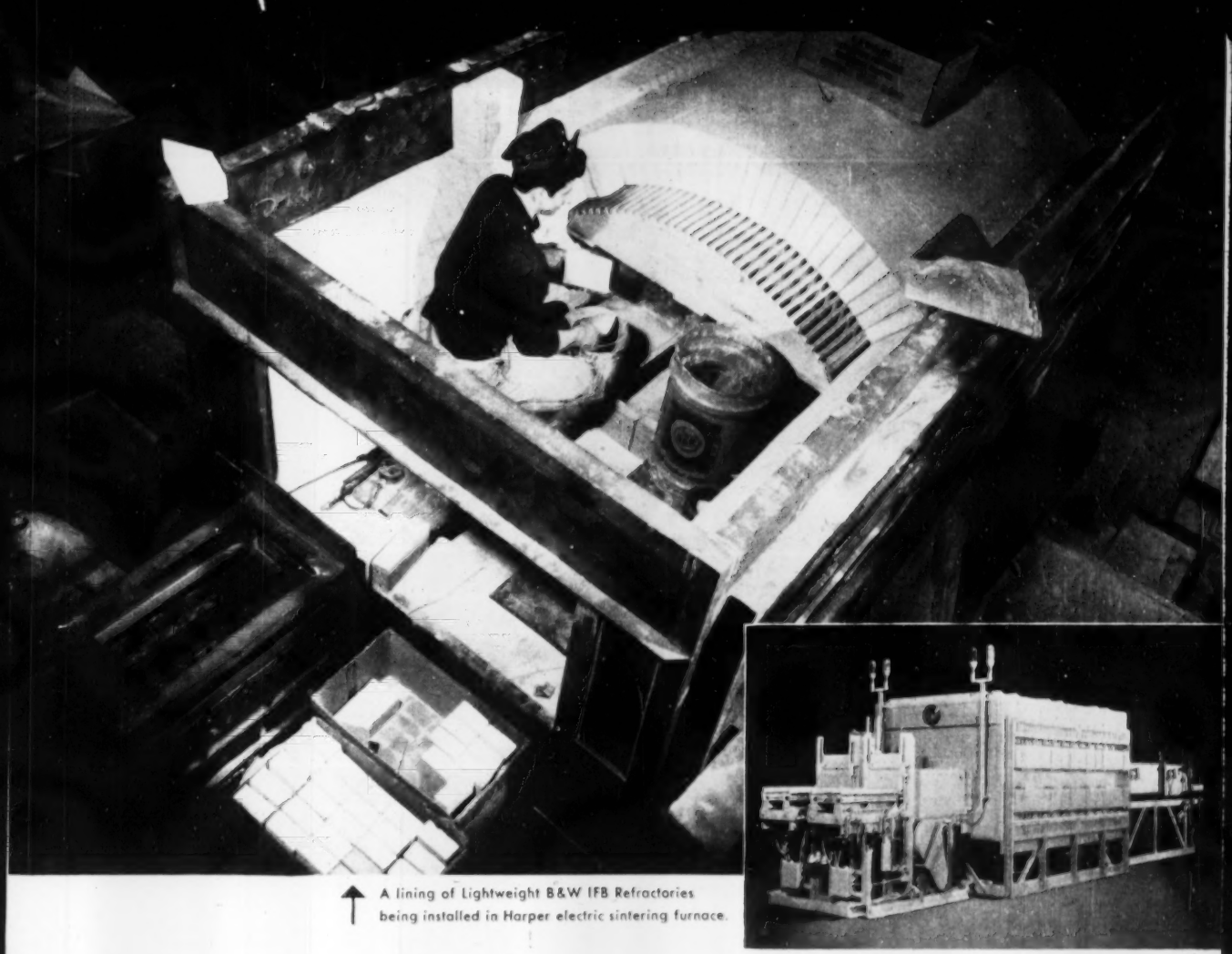
ADAPTABILITY—Ardcor Standard Forming Machines feature "unit construction" for each stand. Thus production changes are easily and quickly made. With this feature, any length base can be furnished to accommodate additional units as required.

Ardcor Roll Forming machines embody the precision, accuracy and stability found only in the highest grade machine tools. In addition, Ardcor offers a completely engineered installation—cradle reels, roll forming machines, roller dies, flying cut-off fixtures, etc. —from one qualified source.

Likely as not your special shapes can be ideally handled by a standard Ardcor machine. Your inquiry is invited—without obligation.

Also Standard Machines up to 4½" Spindle Diameter.

American ROLLER DIE CORPORATION
29520 Clayton • Wickliffe, Ohio



A lining of Lightweight B&W IFB Refractories being installed in Harper electric sintering furnace.

Refractories Maintenance Cut Down

ON HARPER ELECTRIC FURNACES AND KILNS

"Furnace linings that don't last as long as they should can shoot our customers' production costs 'sky high' —and take a big bite out of their profits."

That's one of the reasons why Harper Electric Furnace Corporation standardized on B&W Insulating Firebrick for the electric kilns and furnaces which they manufacture. They know from experience that "B&W IFB last longer than any insulating firebrick we ever tried."

The reason? Volume stable raw materials, unique quality control and manufacturing processes, including B&W's exclusive double burning at temperatures well above use limits—all these factors contribute to more uniform brick and longer life.

B&W IFB, the lightest weight insulating firebrick, also offer these advantages:

Cut electricity or fuel costs— Lighter in weight than any other insulating firebrick, B&W IFB store and conduct less heat. This means faster heating up time, less heat loss during furnace operation. Results? Lower electricity or fuel consumption —often 30% to 50% less than with ordinary heavy firebrick.

Cut installation costs — Hand fitting is easy and fast—B&W IFB can be cut, drilled or shaped on the job with ordinary hand woodworking tools.

Cut down-time — B&W IFB cool off quicker because they store less heat —make possible quick access to the furnace for inspection. Furnace gets back on the line faster, too, because B&W IFB heat up quickly.

These savings explain why B&W Insulating Firebrick are being used in thousands of applications . . . from the largest industrial furnaces to the smallest kilns. Contact your local B&W Refractories Engineer. He may point the way to new savings in your furnace.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

B&W REFRACTORIES PRODUCTS — B&W Alfmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars

R 494

WHY IT PAYS TO BUY STEEL FROM WAREHOUSE

You don't get trapped with big steel stocks!

WHEN YOU BUY STEEL FROM WAREHOUSE, YOU GET:

- LOWER INVENTORY COSTS
- LOWER SPACE COSTS
- LOWER TIME COSTS
- LOWER CAPITAL INVESTMENT
- FASTER PRODUCTION
- FEWER INVENTORY LOSSES

A large steel inventory has many disadvantages. It ties up your capital, it takes up excessive space in your plant, and if product specifications are changed you may be caught with it. You can avoid all three situations by letting U.S. Steel Supply act as your warehouse. We will stock the steel you need, cut it to your specifications, and ship it to your plant or job site in the quantities you need. Your U.S. Steel Supply salesman can work out a convenient steel stocking and delivery schedule for you.

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DIVISION

General Office
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USS

Warehouses
and Sales Offices Coast to Coast

UNITED STATES STEEL

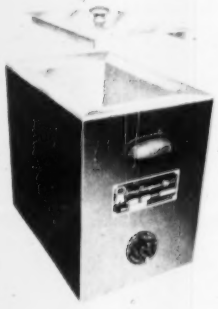
NEW PRODUCTS and equipment

Reply card on page 135 will bring you free literature, editorial clips or more information on new products and equipment described or advertised in this issue

Plastic Tank

. . . has aluminum melting unit

Dipping performance is improved with the use of model 35 plastic melting tank according to Evens-Thompson. An outstanding



new feature is the all cast aluminum melting unit with inward pitched self-draining top that melts plastic faster. The top design eliminates overflow and caking of plastic. It is equipped with Robertshaw precision controls and chrome steel sheathed electric heating elements. The tank has a 3.6-gallon dipping capacity, 15 inches x 18 inches x 19 inches over-all. It weighs 32 pounds and is easy to operate. Evens-Thompson Mfg. Co.

FOR MORE DATA CIRCLE NO. 1 ON REPLY CARD

Carbide Tool Grinder

. . . two-operator worktable

Hammond Machinery has added the Model WD-6 wet or dry carbide tool grinder to its line.

The new grinder incorporates many of the features of their larger 10-inch and 14-inch machines. Among them are: Self-contained pump and tank unit mounted in the base of the machine providing a constant flow of coolant; to compensate for wheel wear, tables adjust in and out by means of screw feed; wheels are quickly and easily changed; two operators can grind

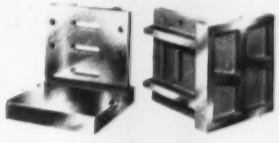
tools at the same time with freedom of movement and unobstructed vision. Hammond Machinery Builders Inc.

FOR MORE DATA CIRCLE NO. 2 ON REPLY CARD

Angle Irons

. . . speed tool and die work

Taft-Pierce has added multiplex angle irons to its line of precision toolroom and inspection equipment.



A general-purpose iron, it has proved to be a valuable timesaver in processing tool and die work.

Made of high quality cast iron, carefully normalized, all surfaces are scraped for accurate flatness and squareness. It is especially helpful in eliminating multiple setups and excessive handling of work in inspection rooms. It will also be useful for boring mills, planers and drill presses. In many instances this iron permits a single setup of the work piece for numerous machining and inspection operations, providing greater work accuracy at less cost. Taft-Peirce Mfg. Co.

FOR MORE DATA CIRCLE NO. 3 ON REPLY CARD

Alkyd Enamels

. . . for trouble-free performance

Broma Spray-It-Yourself Alkyd Enamels are an addition to the Master Bronze Powder Broma line.

These enamels incorporate the newest developments in scientific

paint research as well as the spray packaging industry. Trouble-free performance is assured by a new lower valve assembly specifically designed for paint products. The mounting cup is designed to eliminate cavities and leakage. The

spray head is removable for easy cleaning without damage to the valve assembly. A wide color selection is available. Master Bronze Powder Co.

FOR MORE DATA CIRCLE NO. 4 ON REPLY CARD

Steam-Cleaning Composition

. . . non-toxic, easy to use

The Chemical Research Laboratories of Oakite have developed material, Composition No. 93, specifically designed for use in steam-cleaning operations.

The composition is a white, free-flowing powdered material which is readily and completely soluble in water in a broad range of concentrations and use. It possesses high sequestering ability and, when added to water up to 20 grains hardness, will show no precipitate or turbidity. Solutions of Oakite Composition No. 93 are non-toxic. Oakite Products Inc.

FOR MORE DATA CIRCLE NO. 5 ON REPLY CARD

YOU CAN DEPEND ON

GLOBE

SUPERIOR LADLE BRICK

TO ✓ Cut down-time
✓ Lower per ton cost
✓ Increase melting capacity

SERVING THE STEEL INDUSTRY SINCE 1873 ★

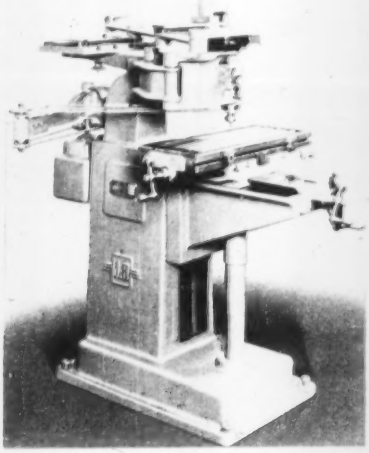
The GLOBE BRICK Co.
EAST LIVERPOOL, OHIO

Pantograph Engraver

. . . varies from 1200 to 1500 rpm

A 2-dimensional pantograph engraver is made for production engraving, profiling, die-cutting and milling in steel, cast iron, nonferrous materials and plastics. With the spindle arm locked, it will also do conventional milling.

Constructed of Mechanite it is



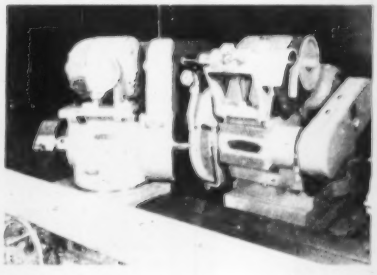
equipped with precision ball bearings with exact settings of pantograph reductions from 1:1 to 1:40 controlled by a simple dial and variable from 1200 to 1500 rpm through the U.S. Varidrive system requiring no belt change. Higher spindle speeds available. Johnson & Bassett Inc.

FOR MORE DATA CIRCLE NO. 6 ON REPLY CARD

Grinding Machine

. . . for extra versatility

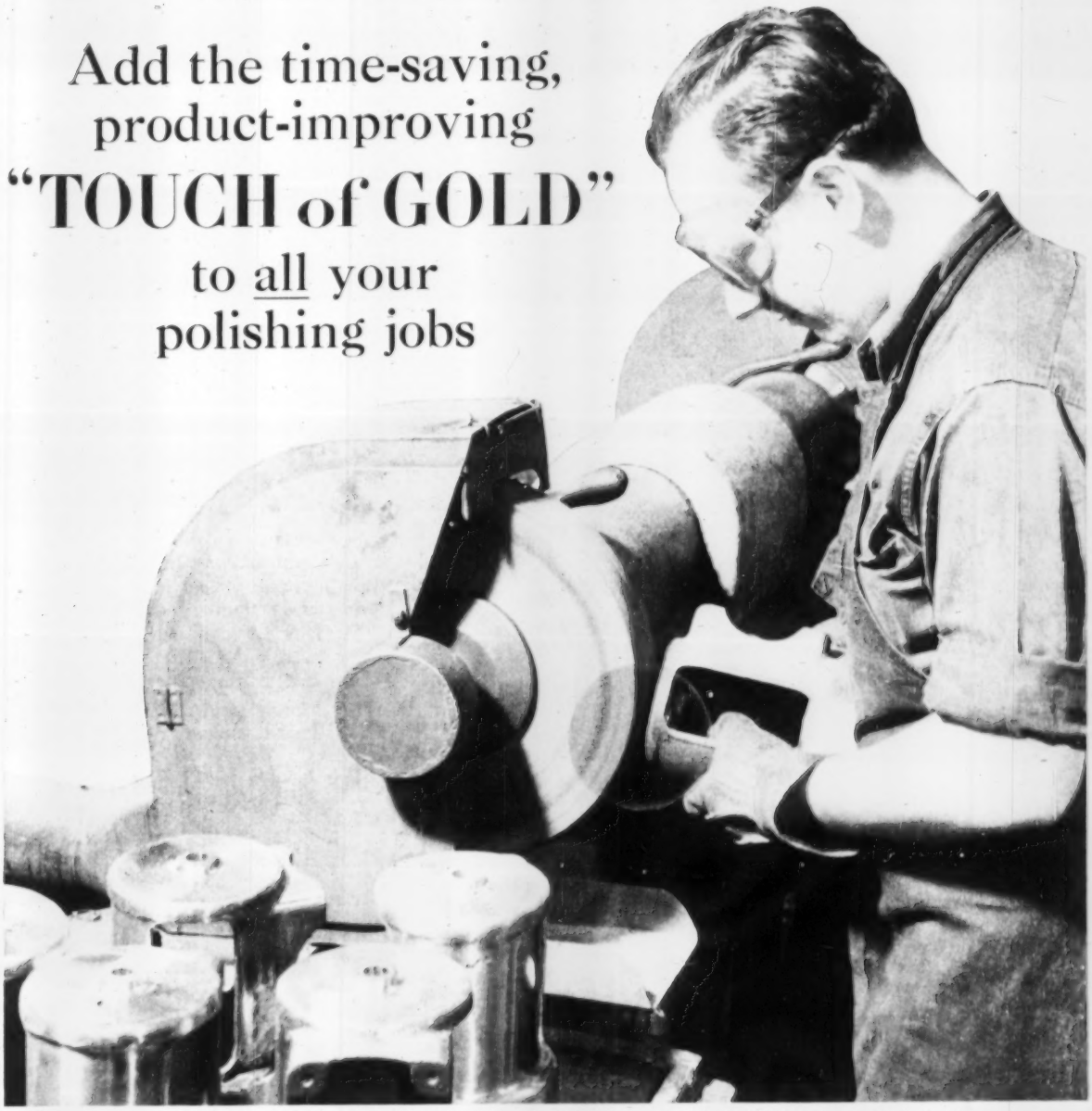
The type U-4, 12-inch universal grinding machine has been designed to provide extra versatility



through simplified setups and fast, precise grinding action for limited production items.

The principal new feature is the swiveling headstock which has a

Add the time-saving, product-improving "TOUCH of GOLD" to all your polishing jobs



Marine Equipment Parts get the value-adding "Touch of Gold" when polished with Norton ALUNDUM* abrasive

When you standardize on Norton ALUNDUM abrasive, every polishing job you do gets off to a better start — and finish!

One reason is because the grains in this Norton-developed abrasive are thoroughly uniform in size, structure and chemical composition. Which means thoroughly uniform polishing, with no oversized grains to mar surfaces, and no flats, slivers or undersized grains to load on the job. And you get *fast* polishing, too, because ALUNDUM abrasive is famous for rapid, clean-cutting action.

Another reason is that ALUNDUM is specially processed to give it high capillarity. With *all* grains soaking up cement or glue uniformly and adequately, *each* grain is held firmly — assuring long-lasting, top-performing polishing wheels.

These Advantages In YOUR Polishing

mean better-finished, better-looking products in less time and for less money — the sure "Touch of Gold" you can add to all your set-ups, manual or automatic.

Your Norton Distributor

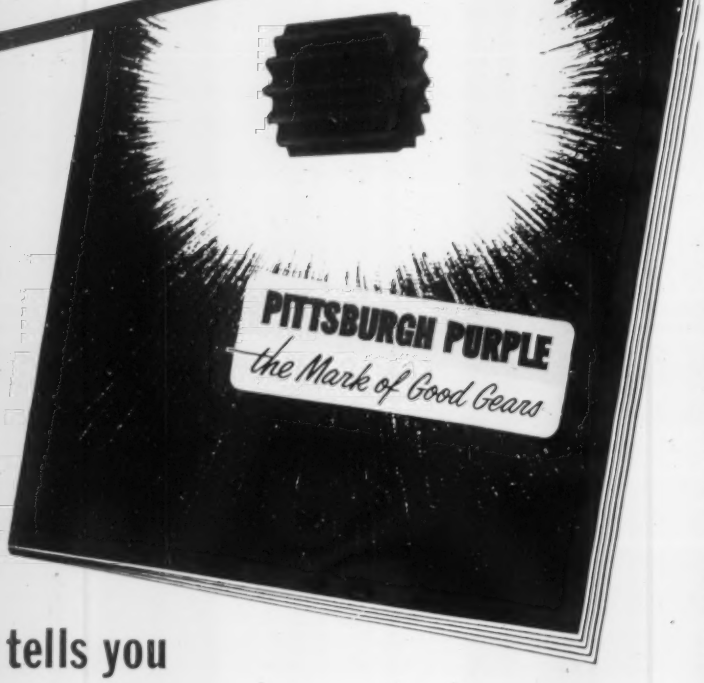
can supply you promptly with ALUNDUM polishing abrasive in the types, sizes and surface treatments you need. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed in your phone directory yellow pages under "Grinding Wheels." *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. G-250

NORTON ABRASIVES

Making better products... to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NEW 8-page Brochure



tells you

why PITTSBURGH Gears will last you longer ... and cost less to use

how PITTSBURGH Gears are made in our newly equipped and enlarged plant

what Types and sizes of PITTSBURGH Gears you can get for your own use ... or in quantities to build into equipment you make

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dog drive plate on one end for conventional grinding and 5-inch D-1 cam lock nose on the other end for mounting chucks or fixtures. To change from a dog-drive setup to a chucking operation, it is only necessary to rotate the headstock 180 degrees and set up the work. When work is being ground on dead centers, the chuck does not rotate because the headstock is a combination live and dead center type. Norton Co.

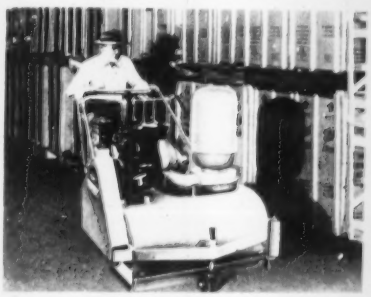
FOR MORE DATA CIRCLE NO. 7 ON REPLY CARD

Power Sweeper

. . . gets dust, fine particles

The Wilshire model 800 power sweeper and its companion, the Wilshire 3-way maintainer, are to be used by large manufacturers and distributors as well as by railroads to maintain safe, sanitary conditions in warehouses, on loading docks and in traffic areas.

The patented Duscon system allows the sweeper to pick up dust,



lint and metal particles too fine to be picked up with a broom. This dust is removed from the heavier debris and deposited in a large capacity dust bag. The maintainer is also equipped with blower and suction systems for removing dust from merchandise, shelves and for picking up dust and debris in corners, under benches and shelves and in bins. Wilshire Power Sweeper Co.

FOR MORE DATA CIRCLE NO. 8 ON REPLY CARD

Spot Solderer

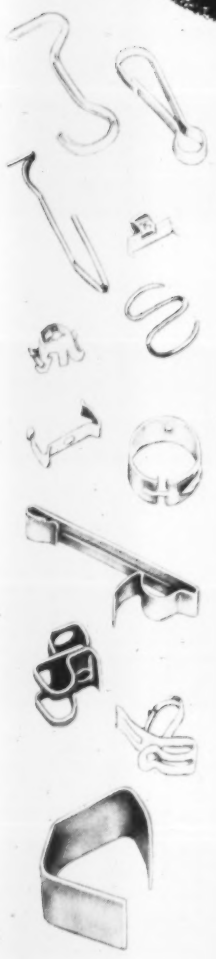
. . . changeable carbon tip

A changeable carbon tip electric spot solderer will give intense concentrated heat instantly on low voltage. The heat given on con-

"Switching to NILSON 4 SLIDES Saved us $17,656 on metal alone"

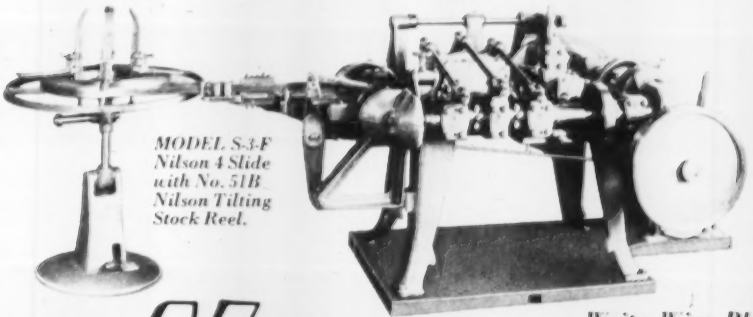
Yes, simply by changing stamping methods, this NILSON Customer profited 4 ways:

1. Production increased 80%.
2. 72% less metal used (per 4 million pieces).
3. Greatly improved quality with minimum of rejects.
4. Strengthened competitive position with greater profit margin.



You, too, can enjoy these advantages in producing your own wire forms and small metal stampings. Parts such as illustrated in the margin were straightened, fed, pierced, blanked, swaged, stamped or coined, cut-off and formed AUTOMATICALLY in NILSON 4 SLIDES in one quick precise operation. *ONE* Machine. *ONE* Operator.

NILSON 4 SLIDES available in wide range of sizes: forming Wire up to ½" diam. in feeds to 32" max. and Metal Ribbon stock up to 3½" wide. Press sections 5 to 30 ton capacity. Heavy Duty Types in 50 and 75 ton models.



MODEL S-3-F Nilson 4 Slide with No. 51B Nilson Tilting Stock Reel.

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NILSON

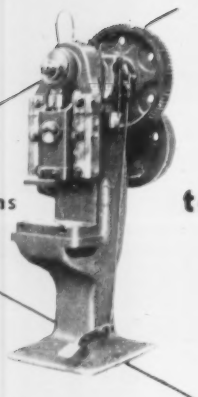
Write, Wire, Phone for full particulars.

THE A. H. NILSON MACHINE COMPANY

1512 Railroad Avenue • Bridgeport 5, Connecticut

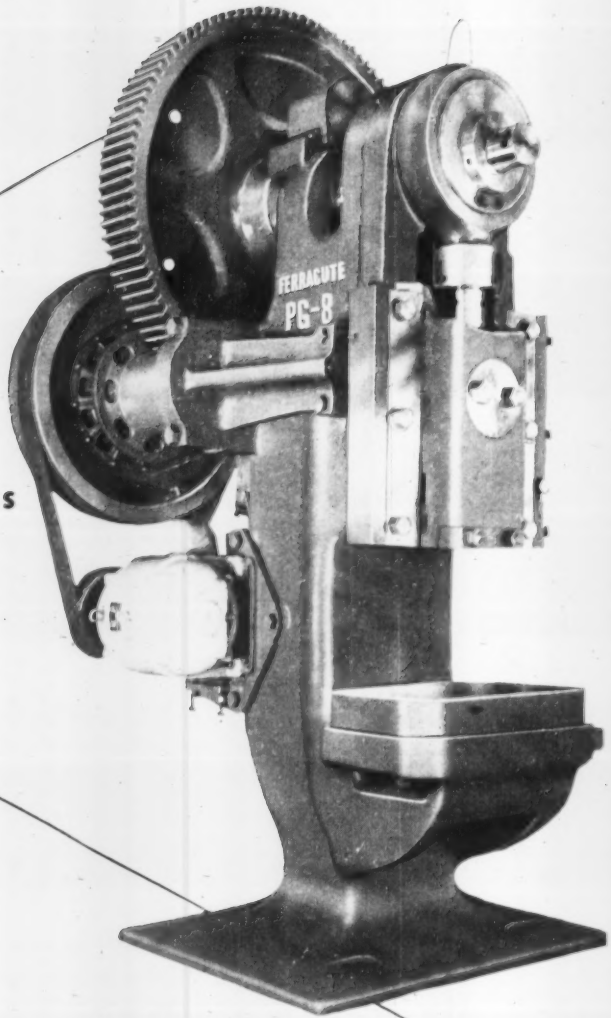
Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

PICK YOUR "P" PRESS FOR YOUR PURPOSE



from 20 tons

to 200 tons



Ferracute PG-3.
40-ton geared
punching press.

Ferracute PG-8.
200-ton punching press.

FERRACUTE

A complete line from 20-tons to 200-tons covering all practical production needs. Available with standard clutch or with air-operated, electrically - controlled FRICTION CLUTCH. Adjustable for continuous or single-stroke operation. Write or wire for full details.

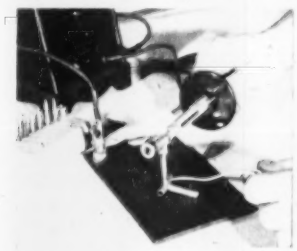
IMMEDIATE DELIVERY on many sizes with standard clutch.

FERRACUTE MACHINE COMPANY

Since 1863, manufacturer of Power Presses and Special Machinery • BRIDGETON, N. J., U. S. A.

tact with the work continues during the entire soldering operation until the contact between the tool and the work is broken.

A second advantage is that it can be fitted with two carbon tips at angles in addition to the end



fitting. The carbon tips can be machined to any shape to facilitate work on unusual and difficult soldering jobs. The two angled tips can be used simultaneously speeding and simplifying work normally difficult to handle. Newage International Inc.

FOR MORE DATA CIRCLE NO. 9 ON REPLY CARD

Thread Compound

. . . acts as a lubricant

A high temperature thread compound has been developed to protect against the welding action of threaded connections subject to

prolonged exposure to extreme heat. Thred-Gard is said to eliminate seizing and galling at operating temperatures up to 1200 F.

It is non-hardening and acts as a lubricant to allow easy disassembly of threaded connections. Damage to stud, bolt, pipe joint and plug threads is prevented, thus permitting the re-use. By reducing wrench torque, it allows fittings to be drawn up to a greater degree of tightness without undue stress or strain. It acts as a protective coating to keep threaded

. . . they call us
"the house of structurals"
LEVINSON STEEL
Beams up to 36"... Beams up to 456 lbs.
Channels and Ship Channels up to 18"
We constantly get calls for extra large sizes in beams or channels . . . structurals that mills roll only two or three times a year can usually be found in Levinson stocks. Chances are we can take care of your inquiries, too. Since we always carry standard sizes in beams, angles, channels, plates, rounds, etc., you can buy to advantage in the larger weight brackets.
• Why not do the obvious thing —call *first* on LESCO!
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NATIONAL DISTRIBUTORS FOR THE LEVINSON STEEL COMPANY
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Central Ohio Warehouse
387 So. Market St., Galion, O.
STEEL WAREHOUSE SERVICE

surfaces smooth and insure pressure-tight, metal to metal contact. Available in ½-pint, 1-pint and 1-quart sizes. Crane Packing Co.

FOR MORE DATA CIRCLE NO. 16 ON REPLY CARD

Safety Topping

. . . slip-proof veneer

The Monroe Co. offers a non-slip, non-skid safety topping for use on steps and floors.

X-L Veneer is a synthetic, heavy-bodied plastic material which contains special solvents and abrasive fillers. When applied, it is said to

form a thin, tightly-bonded veneer that is slip-proof, wet or dry, and which contributes to the elimination of accidents. Easily troweled on, it can be used over concrete, wood, steel, tile, mastic or terrazo floors. It is impervious to oil and grease, and is especially recommended for use around machinery. Monroe Co. Inc.

FOR MORE DATA CIRCLE NO. 15 ON REPLY CARD

Welding Electrodes

. . . prevent flaking

Wear-Arc Super WH electrodes have core wire containing approximately 33 per cent alloy, balanced in proportions new in a hard facing electrode. The carbon content of only 0.35 per cent prevents spalling and flaking of the weld deposit under operating conditions requiring severe impact.

The electrodes operate on either ac or dc current. Tests have indicated that the electrode eliminates the necessity of using stainless steel or other types of electrodes for strength welds and manganese steel rods for wear resistance. The Super WH electrodes will join manganese steel to itself or to any other type of steel with greater strength and rigidity than stainless steel. Alloy Rods Co.

FOR MORE DATA CIRCLE NO. 12 ON REPLY CARD

FREE LITERATURE

Catalogs and Clip Sheets

Reply card on page 135 will bring you free literature, editorial clips or more information on new products and equipment described or advertised in this issue

Rotary Swaging Machines

Torrington Co. Basic advantages of rotary swaging are covered in a booklet offered by Torrington. It lists what you can do quickly, economically and accurately and shows how the Torrington rotary swaging machine works.

FOR MORE DATA CIRCLE NO. 11 ON REPLY CARD

Air-Conditioned Cabs

Lintern Corp. Lintern offers a booklet on how to air condition crane cabs successfully and showing its complete line of Aire-Rectifiers. With this booklet, the prospective user can select the right model for the particular temperature range of the crane in mind. Included is a chart of application temperature and models recommended for particular conditions.

FOR MORE DATA CIRCLE NO. 14 ON REPLY CARD

Washer Catalog

Joliet Wrought Washer Co. This company offers a 12-page catalog covering standard size, stock washer listing, special washers and finishes, machine screw washers, expansion plugs and machinery bushing-washers, etc. Charts and diagrams include American Standard for plain washers and the proposed American Standard for apparatus washers.

FOR MORE DATA CIRCLE NO. 13 ON REPLY CARD

Copper-Electrode Specs

Ampco Metal Inc. Tentative specification for copper and copper-alloy welding electrodes, ASTM designation B 225-53T, AWS designation A 5.6-53T, has been revised and released in printed form. The spec covers all chemical requirements, deposit mechanical properties, methods of testing, preheat and interpass temperatures, standard sizes, etc. for copper and copper-alloy electrodes for metal-arc and the inert-gas consumable electrodes processes.

FOR MORE DATA CIRCLE NO. 10 ON REPLY CARD

Titanium Alloy

Kennametal Inc. A 6-page brochure covers Kennametal's new heat-resistant titanium alloy. Characteristics of typical Kentanium compositions are given, with applications and high temperature properties. Stress rupture strength and density are shown in graph form.

FOR MORE DATA CIRCLE NO. 17 ON REPLY CARD

Slide Rule for Milling

Clarkson Inc. A slide rule for milling speeds and feeds gives readings for tough and medium steel, cast iron, phosphorus, bronze, mild steel, brass and aluminum. Readings are conservative for Clarkson Cutters. Rates should be used as a starting point from which to work up to maximum speed and feed.

FOR MORE DATA CIRCLE NO. 18 ON REPLY CARD

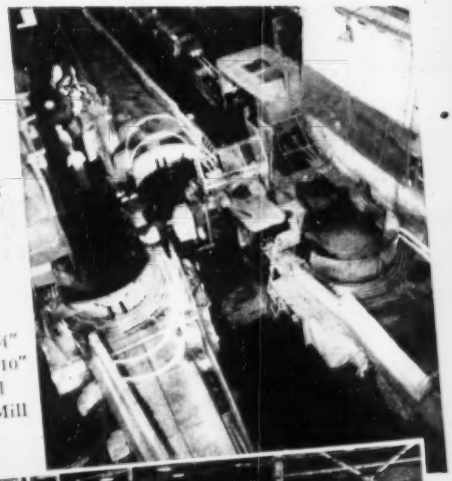
Electroplating Line

Hanson - Van Winkle - Munning Co. A complete line of dc electrical equipment for use in electroplating processes is pictured and described in a 4-page bulletin. The line includes dc generators, rectifiers, PR controllers, tank rheostats and special panels.

FOR MORE DATA CIRCLE NO. 19 ON REPLY CARD

Machinability: Steel, Brass

Titan Metal Mfg. Co. Machinability of free-cutting brass is compared with that of leaded steel in a 48-page booklet just published. It reports results of extensive, closely-controlled research laboratory tests on the two commercial metals, as well as results



View of 14" —12"—10" Mild Steel Rod Mill

...When it's tonnage that counts

depend on

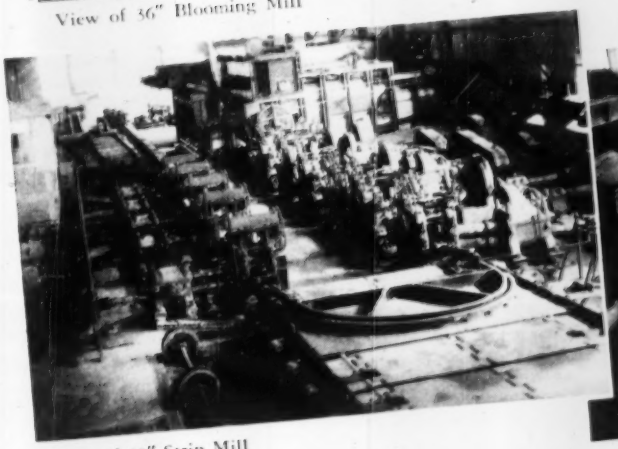
BIRDSBORO

STEEL MILL MACHINERY

For producing Blooms, Billets, Rod, Strip and Merchant Bar.

Birdsboro engineering skill makes possible modern equipment like this that you'll find in leading mills mass-producing billets, rod, sheet, strip, plate and other products to meet today's critical demands. Whenever you find it necessary to modernize your present equipment or add to your facilities—it may be this year or the next—Birdsboro engineers will be glad to work with you on your individual problems.

View of 36" Blooming Mill



View of 10" Strip Mill

View of Merchant Mill

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STEEL FOUNDRY & MACHINE CO.

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Offices in: Birdsboro, Pa. and Pittsburgh, Pa.

STEEL MILL MACHINERY

Designers and Builders of:

Steel Mill Machinery • Crushing Machinery • Rolls
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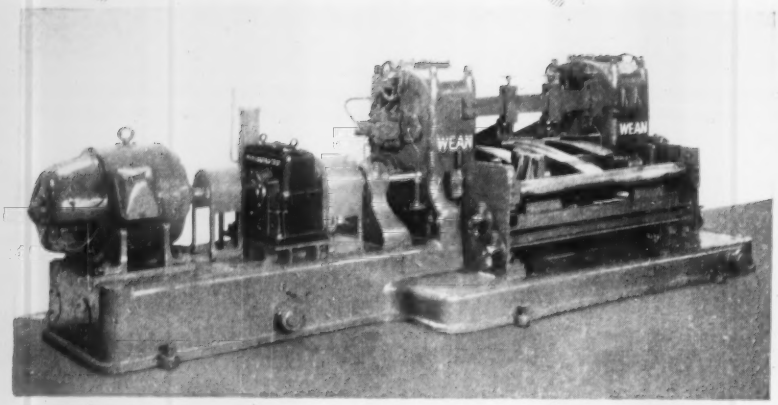

H & S SPEED REDUCERS play a part

in side trimming

strip steel at

high speeds

• Cutting strip steel at high speeds is a tough job and Horsburgh & Scott Speed Reducers play an important role as part of the Wean Side Trimmers . . . available in various sizes for edge trimming hot and cold rolled strip from .006" to ⅜" thick. This is only one of the many fields in industry where H & S Speed Reducers are handling tough jobs for long uninterrupted periods with great savings in maintenance. It will pay you to talk with our engineers about your speed reduction problems.

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

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Send note on Company Letterhead for Speed Reducer Catalog 46

of six-months production runs manufacturing booster bodies out of brass and leaded steel in charts, diagrams and photographs.

FOR MORE DATA CIRCLE NO. 20 ON REPLY CARD

Chemical, Process Equipment

Colonial Iron Works Co.—An 8-page catalog illustrates and describes Colonial's line of standard and custom-made chemical and process equipment, and steel and alloy plate vessels. Highlighted are products engineered for such operations as agitation, distillation, evaporation and heat transfer. Other sections are devoted to standard and custom-made exchangers, standard and custom-made kettles etc.

FOR MORE DATA CIRCLE NO. 21 ON REPLY CARD

Chemical Processing

Allegheny Ludlum Steel Corp.—Allegheny Ludlum has available the second edition of its booklet "Allegheny Metal in Chemical Processing." It is a revised 34-page book covering use of stainless steel in the manufacture of acids and other chemicals, in the general process industries and in the plastics industry. Corrosion resistance data, fabricating information and a stainless steel finder are also among the contents.

FOR MORE DATA CIRCLE NO. 22 ON REPLY CARD

Engineering Metrology

Sheffield Corp.—"A Review of Pneumatic Dimensional Gages," a paper presented at the Symposium on Engineering Metrology in London last October, is offered by Sheffield. The paper points out that measuring is man's greatest accomplishment and shows significance for the future of pneumatic dimensional gaging.

FOR MORE DATA CIRCLE NO. 23 ON REPLY CARD

Milling Machine

Duff Machine Co.—A brochure describing features of the Duff vertical milling machine with universal head is announced. 4 pages cover its operating capacity and specifications.

FOR MORE DATA CIRCLE NO. 24 ON REPLY CARD

Industrial Plastics

Joseph T. Ryerson & Son Inc.—Available from Ryerson is a 16-page illustrated bulletin on industrial plastics. It has data on the

USE A CARD

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manufacture, grades, properties, fabrication and use of laminated plastic sheets, tubes, rods and special shapes. The company's plan for plastic product development and production is covered in detail and performance records of plastic bearings are included.

FOR MORE DATA CIRCLE NO. 25 ON REPLY CARD

Belt Repair Procedure

B. F. Goodrich Co.—An illustrated 32-page manual that tells how to splice and repair conveyor and elevator belting has been released by Goodrich. A series of 42 photographs is used to illustrate step-by-step a proper belt splicing procedure. Materials, tools and conditions for splicing and repairing cord and fabric belts are listed, with special procedure for splicing rayon belts.

FOR MORE DATA CIRCLE NO. 26 ON REPLY CARD

Production Tool

Denison Engineering Co.—Volume 4, No. 3 of the "Denison Press" contains "The Answer to Faster Production," a review of basic construction and operating features of the Denison Multipress. It is intended to answer questions on the use of this production tool. An exploded view of the tool is given with working parts identified.

FOR MORE DATA CIRCLE NO. 27 ON REPLY CARD

Paint Selector

Wilbur & Williams Co.—Paint selection check chart is a quick-answer guide to maintenance painting problems. It enables paint contractors, building contractors, maintenance superintendents, architects to determine immediately paint products that have all the important performance requirements (including cost) for each paint.

FOR MORE DATA CIRCLE NO. 28 ON REPLY CARD

Peerless Production

Peerless Production Co.—Peerless offers a 28-page catalog on their specialized production equipment. Engineering excellence is the theme of the looseleaf catalog, in which 18 representative special machines are illustrated and detailed. Tooling and parts processed by each piece of specialized equipment are shown.

FOR MORE DATA CIRCLE NO. 29 ON REPLY CARD

Stainless Alloy Chart

Cooper Alloy Foundry Co.—A reference chart listing chemical analyses, physical properties and recommended applications for 28 different grades of cast stainless steel has been made available by Cooper. It indicates ACI, AISI, SAE, ASTM and general-type designations. Data as to heat treatment and remarks concerning weldability and machinability are included.

FOR MORE DATA CIRCLE NO. 30 ON REPLY CARD

Electric Furnace

Westinghouse Electric Corp.—An 8-page booklet on belt conveyor electric furnaces describes construction features of major components in detail, supplemented with illustrations. Furnace sizes including complete operating characteristics are tabulated for easy reference. A schematic drawing of the belt conveyor furnace is keyed to a table of dimensions of furnaces.

FOR MORE DATA CIRCLE NO. 31 ON REPLY CARD

Refractories, Heating Elements

Norton Co.—Norton offers two catalogs, one covering refractory products, the other heating elements for electric furnaces and kilns. 11 pages cover tubes, cores, muffles, and in general, the char-

For free literature, editorial clips or more information on products described in this issue, circle the corresponding number at left—or fill in box below.

1	11	21	31	41	51	61	71	81
2	12	22	32	42	52	62	72	82
3	13	23	33	43	53	63	73	83
4	14	24	34	44	54	64	74	84
5	15	25	35	45	55	65	75	85
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7	17	27	37	47	57	67	77	87
8	18	28	38	48	58	68	78	88
9	19	29	39	49	59	69	79	89
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acteristics of their refractory products. 23 pages in a second catalog cover the Crystolon heating elements. Technical data, use, accessories, physical and electrical specs and a temperature conversion chart are given.

FOR MORE DATA CIRCLE NO. 32 ON REPLY CARD

Tool Catalog, Chart

Rockwell Mfg. Co.—Delta Power Tool Division has issued a condensed specifications folder briefly cataloging all principal Delta tools designed for the metalworking industry. It contains 14 photo-illustrated tool descriptions arranged so the opened folder may be used as a wall chart.

FOR MORE DATA CIRCLE NO. 33 ON REPLY CARD

Cleaning Service

Dowell Inc.—A 4-page brochure covers the Dowell chemical cleaning service for industrial equipment. The brochure describes how Dowell service works and recommends applications for this service.

FOR MORE DATA CIRCLE NO. 34 ON REPLY CARD

Standard, Special Taps

Reiff & Nestor Co.—A fully-illustrated 20-page catalog and price list provides complete data regarding size, threads, flutes and prices for standard taps as well as many special taps at standard prices. Several examples are given of tap users' specific production problems solved by R&N engineering.

FOR MORE DATA CIRCLE NO. 35 ON REPLY CARD

Abrasives Line

Abrasive Shot & Grit Co.—Catalog No. AB-53 carries a detailed description of the company's Blastrite line of abrasive materials, including chilled cast iron, H-alloy S cast iron and malleable shot and grit, as well as steel and cut steel wire shot. A consumption chart lists various types of abrasives and consumption in pounds per wheel hour.

FOR MORE DATA CIRCLE NO. 36 ON REPLY CARD

Station-Type Arresters

General Electric Co.—A 28-page bulletin on station-type arresters is announced. The booklet describes operation and design of a new Thyrite magne-valve arrester that combines magnetic and valve action. Application information and a guide for selection of arrester ratings are provided in the illustrated publication.

FOR MORE DATA CIRCLE NO. 37 ON REPLY CARD

Bearing Reference

Bearings Inc.—A comprehensive catalog, No. 54, condenses all information on items obtainable from this firm. Ball, roller and thrust bearings, pillow blocks and specialties are all given extensive coverage. Its 294 pages are designed as a reference, and detailed text is supported by charts, diagrams and illustrations.

FOR MORE DATA CIRCLE NO. 38 ON REPLY CARD

EDITORIAL REPRINTS:

Production Gaging

Management fights to slash out-of-tolerance production. In doing so, they are tying gages onto the production line. Robert F. Huber, STEEL Machine Tool Editor, discusses problems involved and methods being tried in production gaging.

FOR MORE DATA CIRCLE NO. 39 ON REPLY CARD

Modern Coatings

A recent STEEL article gives some practical tips on use of mastics in the maintenance of buildings and structure. Qualities of mastics which make them advantageous for use under most corrosive conditions are reviewed.

FOR MORE DATA CIRCLE NO. 40 ON REPLY CARD

RF Heating

A staff-written STEEL article gives the case history of a company which, with a wide variety of sleeves, adaptors, quick change chucks, etc. to harden, needed versatility. Induction heating was the answer to their problem. Here's why.

FOR MORE DATA CIRCLE NO. 41 ON REPLY CARD

Rare Earths

Valuable properties result from addition of small quantities of rare earths to conventional alloys. Two experts discuss research and plant tests now going on to expand the application of rare earths in many fields.

FOR MORE DATA CIRCLE NO. 42 ON REPLY CARD

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4	14	24	34	44	54	64	74	84
5	15	25	35	45	55	65	75	85
6	16	26	36	46	56	66	76	86
7	17	27	37	47	57	67	77	87
8	18	28	38	48	58	68	78	88
9	19	29	39	49	59	69	79	89
10	20	30	40	50	60	70	80	90

3-29-54

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NAME

TITLE

COMPANY

ADDRESS

STEEL

March 29, 1954

Market Outlook

FIRST faint signs of an upturn in steel production are evident.

Although steel ingot production continued to decline last week, there were more ups than downs in order placement. That's noteworthy, for the new orders placed now determine the ingot rate in the next month. The present ingot rate reflects orders booked several weeks ago, and then ordering was shrinking.

BRIGHT RAYS— Ordering is not brisk, but at least there are evidences of improvement. As sluggish as demand for steel plate has been thus far this year, some producers in looking back over the last two or three weeks detect a mild uptrend. It is so slight it is scarcely discernible in day-to-day trading, but it's apparent when viewed from a greater distance. Although other producers of plate do not detect any increase, they agree that buying is no worse and also that orders are increasingly of a "rush" character, indicating that consumer inventories are becoming worked down.

ENCOURAGING— Hot carbon bar business is still slow but not as slow as it was. Some producers of cold-drawn bars report a definite improvement over the last three weeks. This improvement, along with the importance of making immediate deliveries in order to get business, makes it necessary for one cold-drawer to operate a double shift.

WELCOME— Although the return of seasonal aspects to the steel business is accounting for some of the improvement in ordering, the seasonal improvement is nonetheless welcome. Among the products showing a seasonal upturn are merchant wire goods. One producer of these revealed a "minor landslide" in orders. As a result, this company is needing three weeks to make delivery. A month ago orders were being filled almost immediately. Sales of manufacturers' wire do not show the improvement of merchant wire. However, sales of manufacturers' wire in the Chicago area are running between 10 and 15 per cent over January and February, and April looks promising for further improvement.

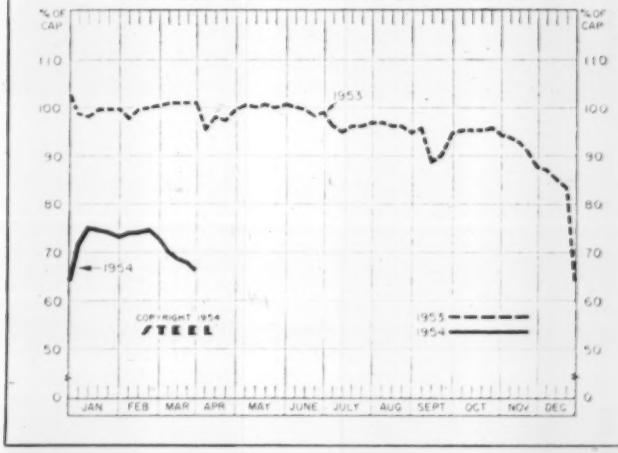
IMPROVED— The Chicago area also shows some strengthening in the gray iron foundry business, due largely to the upturn in farm implement production. As a result, March pig iron shipments will exceed those of each of the previous two months.

Instances of upturns in ordering are noted not only among large steel consumers but among smaller ones, too, for warehouses, suppliers to small users, are noticing some business pickup.

STRONGER— Another suggestion that the decline in steel demand is halting is the improved undertone in the scrap market. Although STEEL's price composite on steelmaking scrap did not rise in the week ended Mar. 25, it maintained the $24.33-a-ton level to which it rose the preceding week.

SLOWER— Continuing to reflect order placement of two to four weeks ago, the national steel ingot production rate declined in the week ended Mar. 28 to 66.5 per cent of capacity. That's a reduction of 1.5 points from the preceding week.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of capacity engaged)

	Week Ended Mar. 28	Change	Same Week 1953	Same Week 1952
Pittsburgh	71.5	— 1.5	106.5	102.5
Chicago	76	— 3	106	107
Mid-Atlantic	61	— 1	97	99
Youngstown	66	0	106	103
Wheeling	70	— 9.5	106.5	100
Cleveland	69	1*	103	99
Buffalo	61.5	0	106.5	104
Birmingham	78	5*	98.5	102
New England	57	3	85	75
Cincinnati	67	4.5	98	94
St. Louis	52	— 8.5	82	86.5
Detroit	85	— 1*	106	107.5
Western	76	— 3	106	105
National Rate	66.5	— 1.5	101	102

INGOT PRODUCTION‡

	Week Ended Mar. 28	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	98.7	100.4*	106.3	144.7
NET TONS (In thousands)	1,585†	1,613*	1,756	2,334

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,384,549 in 1954; 2,254,459 in 1953; 2,077,040 in 1952.

PRICE INDEXES AND COMPOSITES

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics) Week Ended Mar. 23

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, standard, No. 1	$4.400	Bars, H.R., alloy (lb)	$0.575	Strip, C.R., stainless, 430 (lb)	$0.415	Tin plate, hot-dipped, 1.25 lb	$8.433
Rails, light, 40 lb	5.767	Bars, H.R., stainless, 304 (lb)	0.418	Strip, H.R., carbon	4.975	Tin plate, electrolytic, 0.25 lb	7.133
Tie Plates	5.125	Bars, H.R., carbon	4.873	Pipe, black, buttweld (100 ft)	14.454	Black plate, can making quality	6.233
Axles, railway	7.250	Bars, reinforcing	4.566	Pipe, galv., buttweld (100 ft)	17.731	Wire, drawn, carbon	7.713
Wheels, freight car, 33 in. (per wheel)	47.000	Bars, C.F., carbon	7.966	Pipe, line (100 ft)	141.960	Wire, drawn, stainless, 430 (lb)	0.545
Plates, carbon	4.550	Bars, C.F., alloy	11.000	Casing, oil well, carbon (100 ft)	149.516	Bale ties (bundle)	5.653
Structural Shapes	4.367	Bars, C.F., stainless, 302 (lb)	0.433	Casing, oil well, alloy (100 ft)	214.113	Nails, wire, 8d common	7.488
Bars, tool steel, carbon (lb)	0.415	Sheets, H.R., carbon	4.765	Tubes, boiler (100 ft)	‡	Wire, barbed (80-rod spool)	6.799
Bars, tool steel, alloy, oil hardening die (lb)	0.505	Sheets, C.R., carbon	5.764	Tubing, mechanical, carbon (100 ft)	‡	Woven wire fence (20-rod roll)	16.065
Bars, tool steel, H.R., alloy, high speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.075	Sheets, galvanized	6.945	Tubing, mechanical, stainless, 304 (100 ft)	161.193		
Bars, tool steel, H.R., alloy, high speed W 18, Cr 4, V 1 (lb)	1.550	Sheets, C.R., stainless, 302 (lb)	0.548				
		Sheets, electrical	9.000				
		Strip, C.R., carbon	7.243				

‡ Not available.

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Mar. 23 1954	Mar. 16 1954	Month Ago	Feb. Average
(1947-1949=100)	140.9	140.9	141.0	140.9

STEEL's FINISHED STEEL PRICE INDEX*

	Mar. 25 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	189.74	189.74	189.74	181.31	154.85
Index in cents per lb	5.140	5.140	5.140	4.912	4.195

STEEL's ARITHMETICAL PRICE COMPOSITES

	Mar. 25 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Finished Steel, NT*	$113.73	$113.73	$113.91	$110.98	$97.23
No. 2 Fdry Pig Iron, GT	56.54	56.54	56.54	55.04	46.63
Basic Pig Iron, GT	56.04	56.04	56.04	54.66	46.22
Malleable Pig Iron, GT	57.27	57.27	57.27	55.77	47.34
Steelmaking Scrap, GT	24.33	24.33	25.50	44.17	33.66

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 136.

COMPARISON OF PRICES

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Mar. 25 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.15	4.15	4.15	3.95	3.45
Bars, H.R., Chicago	4.15	4.15	4.15	3.95	3.35
Bars, H.R., del. Philadelphia	5.302	5.302	5.302	4.502	3.816
Bars, C.F., Pittsburgh	5.20	5.20	5.20	4.925	3.95
Shapes, Std., Pittsburgh	4.10	4.10	4.10	3.85	3.275
Shapes, Std., Chicago	4.10	4.10	4.10	3.85	3.25
Shapes, del. Philadelphia	4.38	4.38	4.38	4.13	3.492
Plates, Pittsburgh	4.10	4.10	4.10	3.90	3.50
Plates, Chicago	4.10	4.10	4.10	3.90	3.40
Plates, Coatesville, Pa.	4.10	4.10	4.10	4.35	3.75
Plates, Sparrows Point, Md.	4.10	4.10	4.10	3.90	3.45
Plates, Claymont, Del.	4.10	4.10	4.10	4.35	3.95
Sheets, H.R., Pittsburgh	3.925	3.925	3.925	3.775	3.275
Sheets, H.R., Chicago	3.925	3.925	3.925	3.775	3.25
Sheets, C.R., Pittsburgh	4.775	4.775	4.775	4.575	4.00
Sheets, C.R., Chicago	4.775	4.775	4.775	4.575	4.00
Sheets, C.R., Detroit	4.975	4.975	4.975	4.775	4.20
Sheets, Galv., Pittsburgh	5.275	5.275	5.275	5.075	4.40
Strip, H.R., Pitts.	4.425	4.425	4.425	3.975-4.225	3.275
Strip, H.R., Chicago	3.925	3.925	3.925	3.725	3.25
Strip, C.R., Pittsburgh	5.45	5.45	5.45	5.10-5.80	4.375
Strip, C.R., Chicago	5.70	5.70	5.70	5.35	4.00
Strip, C.R., Detroit	5.45-6.05	5.45-6.05	5.45-6.05	5.30-6.05	4.45
Wire, Basic, Pitts.	5.525	5.525	5.525	5.225-5.475	4.325
Nails, Wire, Pittsburgh	6.55	6.55	6.55	6.35	5.775
Tin plate (1.50 lb), box, Pitts.	$8.95	$8.95	$8.95	$8.95	$7.75

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$75.50	$75.50	$75.50	$70.50	$61.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	4.525	4.525	4.525	4.425	3.775

PIG IRON, Gross Ton

	Mar. 25 1954	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$57.00	$57.00	$57.00	$55.50	$47.00
Basic, Valley	56.00	56.00	56.00	54.50	46.00
Basic, del. Phila.	59.66	59.66	59.66	59.25	50.30
No. 2 Fdry, Pitts.	56.50	56.50	56.50	55.00	46.50
No. 2 Fdry, Chicago	56.50	56.50	56.50	55.00	46.25
No. 2 Fdry, Valley	56.50	56.50	56.50	55.00	46.50
No. 2 Fdry, del. Phila.	60.16	60.16	60.16	59.75	50.80
No. 2 Fdry, Birm.	52.88	52.88	52.88	51.38	43.38
No. 2 Fdry (Birm.) del. Cin.	60.43	60.43	60.43	58.93	49.43
Malleable, Valley	56.50	56.50	56.50	55.00	46.50
Malleable, Chicago	56.50	56.50	56.50	55.00	46.50
Ferromanganese, Duquesne	200.00†	200.00†	200.00†	228.00*	175.00*

*75-82% Mn, gross ton, Etna, Pa. †74-76% Mn, net ton.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pitts.	$25.50	$25.50	$28.50	$44.00	$36.00
No. 1 Heavy Melt, E. Pa.	22.00	22.00	25.00	46.00	31.50
No. 1 Heavy Melt, Chicago	25.50	25.50	25.00	42.50	33.50
No. 1 Heavy Melt, Valley	23.50	23.50	24.50	44.25	37.25
No. 1 Heavy Melt, Cleve.	20.50	20.50	21.50	44.25	35.25
No. 1 Heavy Melt, Buffalo	24.00	24.00	25.00	47.00	35.25
Rails, Rerolling, Chicago	36.50	36.50	36.50	56.00	42.50
No. 1 Cast, Chicago	33.00	33.00	29.50	43.00	37.00

COKE, Net Ton

Beehive, Furn. Connlsvl.	$14.75	$14.75	$14.75	$14.75	$14.50
Beehive, Fdry, Connlsvl.	16.75	16.75	16.75	17.00	17.00
Oven, Fdry, Chicago	24.50	24.50	24.50	24.50	20.40

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

PRIMARY METALS AND ALLOYS

Aluminum: 99+%, ingots 21.50, pigs 20.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 23.30; No. 43, 5% Si, 23.10; No. 142, 4% Cu, 24.40; No. 195, 4.5% Cu, 0.8% Si, 23.70; No. 214, 3.8% Mg, 24.40; No. 356, 7% Si, 0.3% Mg, 23.20.

Antimony: R.M.M. brand, 99.5% 28.50, Lone Star brand, 29.00, f.o.b. Laredo, Texas, in bulk. Foreign brands, 99.5%, 25.50-26.00 New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa.

Beryllium Copper: 3.75-4.25% Be, $40.00 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa. or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb del.

Cobalt: 97-99%, $2.60 per lb for 550 lb keg, $2.62 per lb for 100 lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $75.00 per lb, nom.

Copper: Electrolytic 29.75-30.00 del. Conn. Valley, 29.875-30.125 del. Midwest; Lake 30.00 del.; Fire refined 29.75 del.

Germanium: 99.9%, $295 per lb nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $145-$150 per troy oz.

Lead: Common, 12.80, chemical 12.90, corroding 12.90, St. Louis, New York basis, add 0.20.

Lithium: 98%, $11-$14 per lb, depending on quantity.

Magnesium: 99.8%, selfpalletizing pig 27.00; notched ingot 27.75, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., and Madison, Ill., add 1.20 for pig and 1.25 for ingot. Sticks, 1.3 in. diameter, 46.00, 100 to 4999 lb, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, H, G and R 32.50; alloy M 34.50, 10,000 lb or more, f.o.b. Freeport, Tex., or Madison, Ill. Add 1.20 for Port Newark, N. J.

Mercury: Open market, spot, New York, $202-$204 per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced $3.40 per lb; pressed ingot $4.06 per lb; sintered ingot $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked 60.00; 25-lb pigs 62.65; "XX" nickel shot 63.65; "F" nickel shot or

DAILY NONFERROUS PRICE RECORD

	Price Mar. 25	Change	Previous Price	Feb. Avg.	Jan. Avg.	Mar. 1953 Avg.
Copper	29.75-30.00	Mar. 3	29.50-30.00	29.750	29.750	30.510
Lead	12.80	Mar. 10	12.55	12.610	13.060	13.300
Zinc	9.75	Mar. 10	9.25	9.369	9.760	11.000
Tin	94.50	Mar. 24	95.50 nom.	85.181	85.100	121.500
Nickel	60.00	Jan. 14	56.50	60.000	60.000	60.000
Aluminum	21.50	July 15	20.50	21.500	21.500	20.500
Magnesium	27.00	Mar. 9	24.50	27.000	27.000	24.500

Quotations in cents per pound based on: Copper, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Nickel, electrolytic cathodes, 99.9%, base size at refinery unpacked; Aluminum, primary ingots, 99 + %, del.; Magnesium 99.8%, Freeport, Tex.

ingots for addition to cast iron, 60.00; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $140-$150 per troy oz nom.

Palladium: $21 per troy oz.

Platinum: $84-$87 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $125 per troy oz.

Ruthenium: $70-$75 per troy oz.

Selenium: 99.5%, $5-$6 per lb.

Sodium: 16.50, carlots; 17.00 l.c.l.

Tantalum: Sheet, rod $39.00 per lb; powder $33.50 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, New York spot, 94.50; prompt, 92.50 nom, as of Mar. 25.

Titanium: Sponge, 99.3+%, $5 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000 lb lots $4.95 per lb f.o.b. shipping point; less than 1000 lb $5.10; 99+% hydrogen reduced, $5.85. Treated ingots $7.95.

Zinc: Prime Western 9.75, brass special 10.00, intermediate 10.25, E. St. Louis, freight allowed over 0.50 per pound. High grade 11.10, special high grade 11.25, die casting alloy ingot 13.75, del.

Zirconium: Sponge $10 per lb; powder electronics grade $15, flash grade $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston Alloys 19.50-20.50; No. 12 foundry alloy (No. 2 grade) 19.00-19.50; 5% silicon alloy, 0.60 Cu max., 22.00-22.50; 13 alloy, 0.60 Cu max., 22.00-22.50; 195 alloy 21.00-21.50; 108 alloy 19.50-20.00 steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 20.00-21.00; grade 2, 19.00-19.50; grade 3, 18.00-18.50; grade 4, 16.50-17.00.

Brass Ingot: Red brass, No. 115, 23.50; tin bronze No. 225, 34.25, No. 245, 28.50; high-leaded tin bronze, No. 305, 27.75; No. 1 yellow, No. 405, 19.75; manganese bronze No. 421, 24.25.

Magnesium Alloy Ingot: AZ63A, 31.50; AZ91B, 29.00; AZ91C, 31.50; AZ92A, 31.50.

NONFERROUS MILL PRODUCTS

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000 lb lots, 35.36; 30,000 lb lots, 35.48; l.c.l. 35.98. Weatherproof, 100,000 lb, 36.28; 30,000 lb, 36.53; l.c. 37.03. Magnet wire del., 15,000 lb or more 41.83; l.c.l., 42.58.

LEAD

(Prices to jobbers f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more $18.00 per cwt; pipe, full coils $18.00 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb 100,000 lb and over, f.o.b. mill.) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forging billets, $6; hot-rolled and forged bars, $6.

ZINC

Sheets 23.00, f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 19.50-20.50, f.o.b. mill, 36,000 lb and over. Plates 19.00-22.25.

ZIRCONIUM

Plate $27; H.R. strip $28; C.R. strip $85; forged or H.R. bars $27; wire, 0.015 in., 1 cent per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheet, C.R.	86.5	67.5	92.5
Strip, C.R.	92.5	70.5	98.5
Plate, H.R.	84.5	66.5	90.5
Rod, Shapes	82.5	65.5	88.5
Seamless Tubes	115.5	100.5	137.5
Shot, Blocks	....	60.0	....

ALUMINUM

(30,000 lb base; freight allowed over 499 lb) Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Inc.	Flat Sheet*	Coiled Sheet	Coiled Sheet Circle†
0.249-0.136	12-49	33.9	...	...
0.135-0.096	12-48	34.4	...	...
0.095-0.077	12-48	35.1	32.7	37.5
0.076-0.061	12-48	35.7	32.9	37.7
0.060-0.048	12-48	36.1	33.2	38.1
0.047-0.038	12-48	36.6	33.6	38.4
0.037-0.030	12-48	37.0	34.0	39.1
0.029-0.024	12-48	37.6	34.3	39.6
0.023-0.019	12-36	38.3	35.1	40.4
0.018-0.017	12-36	39.1	35.7	41.3
0.016-0.015	12-36	40.0	36.5	42.5
0.014	12-24	41.0	37.5	43.8
0.013-0.012	12-24	42.1	38.2	44.8
0.011	12-24	43.1	39.4	46.4
0.010-0.0095	12-24	44.3	40.5	48.0
0.009-0.0085	12-24	45.6	41.9	50.0
0.008-0.0075	12-24	47.1	43.1	51.8
0.007	12-18	48.6	44.6	54.1
0.006	12-18	50.2	46.0	59.1

* 72-180 in. lengths. † 24 in. max. dia.

ALUMINUM

Plates and Circles: Thickness 0.250-3.0 in., 24-60 in. width or dia., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
2S-F, 3S-F	32.4	36.3
50S-F	33.5	37.4
4S-F	34.5	39.1
52S-F	36.2	40.9
61S-T6	37.4	41.5
24S-T4*	39.3	45.4
75S-T6*	47.1	53.7

* 24-48 in. widths or dia., 72-180 in. lengths.

ALUMINUM

Screw Machine Stock: 5000 lb and over.

Dia. (in.) or across flats	Round 11S-T3	Round 17S-T4	Hexagonal 11S-T3	Hexagonal 17S-T4
Drawn				
0.125	59.6	57.9	...	....
0.156-0.172	50.6	48.9	...	...
0.188	50.6	48.9	...	62.4
0.219-0.234	47.9	46.2	...	...
0.250-0.281	47.9	46.2	...	59.8
0.313	47.9	46.2	...	56.9
Cold-finished				
0.375-0.531	46.6	44.9	56.2	53.4
0.563-0.688	46.6	44.9	53.4	50.2
0.750-1.000	45.5	43.8	48.9	47.3
1.063	45.5	43.8	...	45.7
1.125-1.500	43.8	42.1	47.3	45.7
Rolled				
1.563	42.7	41.0	...	...
1.625-2.000	42.1	40.4	...	44.1
2.125-2.500	41.1	39.4	...	...
2.750-3.375	39.9	38.2	...	...

ALUMINUM

Forging Stock: Round. Class 1, 43.8-34.4, in specific lengths 36-144 in., diameters 0.375-8 in.; rectangles and squares Class 1, 50.2-38.4 in random lengths 0.375-4.0 in. thick, widths 0.750-10.0 in.

Pipe: A.S.A. Schedule 40, alloy 63S-T6, 20 ft length, plain ends, 90,000 lb base, per 100 ft.

Nom. pipe size, in.		Nom. pipe size, in.	
⅛	$15.05	2	$ 46.30
1	23.65	4	127.70
1¼	32.00	6	228.50
1½	38.25	8	343.80

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032-in. 50.00, 0.064-in. 73.00, 0.125-in. 60.00, 30,000 lb and over, f.o.b. mill.

Plate: Hot-rolled AZ31, 53.00, 20,000 lb or more 0.250-in. and over, widths to 48 in., lengths to 144 in.; raised pattern floor plate, 59.00, 20,000 lb or more, ¼-in. thick, widths 24-72 in., lengths 60-192 in.

Extrusion Stock: AZ31, Rectangles, ¼ x 2 in. 60.20, 1 x 4 in. 63.00. Rod, 1 in. 66.00, 2 in. 62.50. Tubing, 1 in. OD x 0.065-in. 87.00. Angles, 1 x 1 x ⅛-in. 72.90, 2 x 2 x ¼-in. 67.00. Channels, 5 in. 67.80. I-Beams, 5 in. 66.20.

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 28 clippings 11.50; low copper clippings 11.50; mixed clippings 9.50-10.50; old sheet 8.50-9.50; borings and turnings 6.00; pistons and struts 6.00; crankcases 8.50-9.50; industrial castings 8.50-9.50.

Copper and Brass: Heavy copper and wire, No. 1 23.50-24.00; No. 2 copper 21.50-22.00; light copper 19.50-20.00; No. 1 composition red brass 17.00-17.50; No. 1 composition turnings 16.50-17.00; mixed brass turnings 11.00-11.50; new brass clippings 16.50-17.00; No. 1 brass rod turnings 12.00-12.50; light brass 10.50-11.00; heavy yellow brass 12.50-13.00; new brass rod ends 14.50-15.00; auto radiators, unsweated, 13.00-13.50; cocks and faucets 14.50-15.00; brass pipe 16.00-16.50.

Lead: Heavy 9.50-10.00; battery plate 5.00-5.50; linotype and stereotype 12.25; electrotype 10.50; mixed babbitt 11.50-12.00.

Magnesium: Clippings 18.50-19.50; clean castings 17.50-18.50; iron castings, not over 10% removable Fe 16.50-17.50.

Monel: Clippings 24.00-26.00; old sheet 22.00-24.00; turnings 16.00-18.00; rods 23.00-25.00.

Nickel: Sheets and clips 60.00-65.00; rolled anodes 60.00-65.00; turnings 40.00; rod ends 60.00-65.00.

Tin: No. 1 pewter 40.00-45.00; block tin pipe 65.00-67.00; No. 1 babbitt 37.00-38.00.

Zinc: Old zinc, 3.75; new die cast scrap, 3.50; old die cast scrap, 3.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 28, 38 clippings 14.50-15.00; 51S, 52S clippings 14.50-15.00; 14S, 17S, 24S clippings 13.00-14.00; mixed clippings 13.00-14.00; old sheet 11.50-12.00; old cast 11.50-12.00; clean old cable, free of steel 14.50-15.00; borings and turnings 12.00-12.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 42.00; light scrap 37.00.

Copper, Brass: No. 1 copper 25.50-26.00; No. 2 copper 24.00-24.50; light copper 22.50-23.00; refinery brass (60% copper) per dry copper content 21.00-21.50; auto radiators, 15.00, nominal.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper, Brass: No. 1 copper 26.00; No. 2 copper 24.50; light copper 23.00; No. 1 composition borings 18.50; No. 1 composition solids 19.00; heavy yellow brass solids 14.50; yellow brass turnings 13.50; radiators 15.00.

PLATING MATERIALS

(F.o.b. shipping points, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes $1.75 per lb.

Copper: Flat-rolled 45.04, oval 44.54, 2000-5000 lb; electrodeposited 39.78, cast 42.04, 5000-10,000 lb lots.

Nickel: *Depolarized*, less than 500 lb 92.00; 500-4999 lb 88.00; over 5000 lb 86.00.

Tin: Bar or slab, less than 200 lb $1.105; 200-499 lb $1.09; 500-999 lb $1.085; 1000 lb or more $1.08.

Zinc: Bar 18.50, bar or flat top 17.50, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100 lb drums.

Chromic Acid: Less than 10,000 lb 28.50; over 10,000 lb 27.50.

Copper Cyanide: Under 1000 lb 63.90, 1000 lb and over 61.90.

Copper Sulphate: 100-6000 lb 11.35; 6000-12,000 lb 11.10; 12,000-24,000 lb 10.85; 24,000-36,000 lb 10.60; 36,000 lb and over 10.35.

Nickel Chloride: 100 lb 45.00; 200 lb 43.00; 300 lb 42.00; 400-4900 lb 40.00; 5000-9900 lb 38.00; 5,000-35,000 lb.

Nickel Sulphate: 100 lb 37.00; 200 lb 35.00; 300 lb 34.00; 400-4900 lb 32.00; 5000-35,000 lb 30.00; 36,000 lb and over 29.00.

Silver Cyanide: Cents per ounce, 16 oz 80.625; 100 oz 78.50; 25,000 oz and over 77.325.

Sodium Cyanide: Egg, under 1000 lb 19.80, 1000-19,999 lb 18.80, 20,000 lb and over 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb 70.6; 100-600 lb 56.3; 700-1900 lb 53.9; 2000-5000 lb 52.1; 10,000 lb or more 51.0.

Stannous Chloride (Anhydrous): Less than 50 lb $1.564; 50 lb $1.224; 100-300 lb $1.024; 400-900 lb $1.045; 100-1900 lb $1.025; 2000-4500 lb 98.8; 5000-19,000 lb 92.7; 20,000 lb and over 89.6.

Stannous Sulphate: Less than 50 lb $1.264; 50 lb 99.4; 100-1900 lb 94.4; 2000 lb and over 91.4.

Zinc Cyanide: Under 1000 lb 54.30, 1000 lb and over 52.30.

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	48.38b	45.98c	....	48.44	26.000	26.000	25.250
Yellow Brass	41.72	33.50d	42.26	44.63	19.750	19.500	18.000
Red Brass, 85%	45.44	45.38	45.98	48.25	23.000	22.750	22.250
Low Brass, 80%	44.47	44.41	45.01	47.28	22.125	21.875	21.375
Naval Brass	45.76	40.07	52.80	48.92	18.250	18.000	17.500
Commercial Bronze, 90%	46.95	46.89	47.49	49.51	23.875	23.625	23.125
Nickel Silver, 10%	55.36	59.43g	57.69	....	23.625	23.375	11.813
Phosphor Bronze, A, 5%	66.58	67.08	67.08	68.23	24.125	25.875	24.875
Silicon Bronze	52.71	51.99	52.75	70.11e	25.125	24.875	24.125
Manganese Bronze	49.48	43.62	54.06	....	18.250	18.000	17.500
Muntz Metal	43.96	39.77	....	....	18.625	18.375	17.875

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 pounds, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

Nonferrous Metals

Sales of nonferrous metals turn upward, giving a new ring of authority to prices and lengthening delivery times in some instances

THERE'S a new ring of authority in metal prices as the long-awaited sales upturn takes hold.

It's not limited to lead and zinc alone. They rounded bottom early this month (STEEL, Mar. 15, p. 166) and have managed to stick at fractionally higher prices. With few exceptions, market men are noting spring's arrival on their order books as well as on the calendar.

Gaining Momentum—March totals will show aluminum business back on an even keel after tipping badly from October into January, say industry representatives. In some sectors a slight lengthening in delivery times is reported.

Today, deliveries shape up about like this: Sheet 4-6 weeks; foil 3-4 weeks; wire, rod and bar 3-6 weeks; tubing 3-4 weeks; extrusions 5-7 weeks; forgings 8-10 weeks.

Status Quo—Copper sales in March promise to top the previous two months even though procrastination in Chile over selling its copper and allowing production cutbacks casts a dark cloud over future buying. Wire and cable sales have turned upward surprisingly well. Foundry and brass mill activity is still slow, but even here scattered signs of revival appear.

Most brass mills are on seven-hour day or similarly shortened work week. New orders booked by brass mills, wire mills and foundries in February were only half the tonnage recorded a year ago, though up slightly from January. Shipments totaled 93,342 tons copper content, off about 7500 tons from January and nearly 25 per cent under February, 1953.

Washington Assist—Riding well-placed and well-spread rumors of pending government stockpiling, lead and zinc firmed decidedly as sales increased at new levels. Buyers of both showed more interest in forward buying; most lead sales were placed on a flat-price basis and talk of a further price increase can't be easily discounted.

Tin, buoyed by the combination of a New York dock standstill and likelihood of an international price and production-fixing agreement going into effect this spring, maintained its highest crest in nearly a year. Bolivian diplomats are seeking to sell RFC up to 20,000 tons of tin over the next year, but that agency, with only three months of official existence left, isn't having any.

Wire and Cable Turn Up

Fast-shifting wire and cable business is witnessing a significant upturn. Price increase of 6 per cent on building wire was put in effect last week by leading sellers. Scattered raises of up to 20 per cent were set by some firms several weeks ago but melted under competitive pressure.

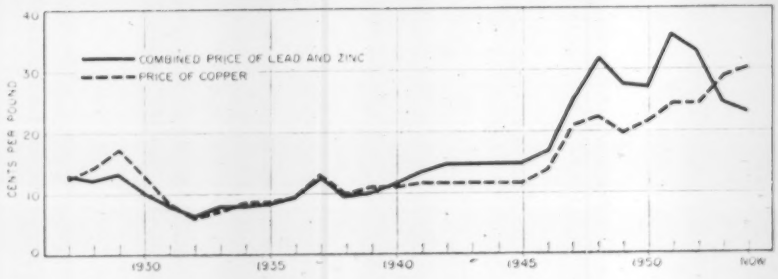
Copper wire and cable prices have tumbled about 40 per cent in the last year, but base prices haven't been changed since July. Aluminum products haven't suffered such discount competition, though some adjustments have been made in wire and cable schedules. Refined copper price doesn't mean so much in setting building wire prices, but magnet wire, bare and weatherproof wire are affected.

Today wire is again active and many people are buying ahead, according to sales officials. Orders are not only for current needs but for some stock replenishment. Upturn in building wire is not seasonal as spring building has not started to blossom yet. Sales of power cable for industrial plants and military installations are reported strong. Because profit margins have been whittled by the sharp competition, further price advances are believed possible if the business pickup continues.

New Machine Stock

Deep-drawn aluminum machine stock is now being marketed by Harvey Aluminum, Torrance, Calif. It's said to be "in a highly competitive position with any other aluminum machining stock." Deep drawing the extruded aluminum rod and bar under high pressure from the outside to the core develops recrystallized microstructure with uniform grain size and composition, hardness and tolerances, says Harvey.

The Harvey aluminum sections are stretcher straightened to relieve internal stresses set up during heat treating and quenching. Hexagonal material has no large grain size at points of the hex, and threading is accomplished without chattering or tearing, says G. A. Moudry, chief metallurgist.



Ever the Twain Shall Meet?

THE WELL-ESTABLISHED past relationship between the combined lead-zinc price and the price of copper will recur eventually, believes Simon D. Strauss, vice president, American Smelting & Refining Co., New York.

Historically, the combined price of lead and zinc approximately equals the price of copper. The chart, comparing these two price lines over the last 27 years, shows that copper today is a third higher than the sum of lead and zinc.

"It is difficult to explain this drastically revised relationship on the basis of the normal factors of supply and demand," Mr. Strauss says. "Consumption of all three metals in the United States is currently below the rate of last year, but the extent of the drop is approximately the same for all three," he points out.

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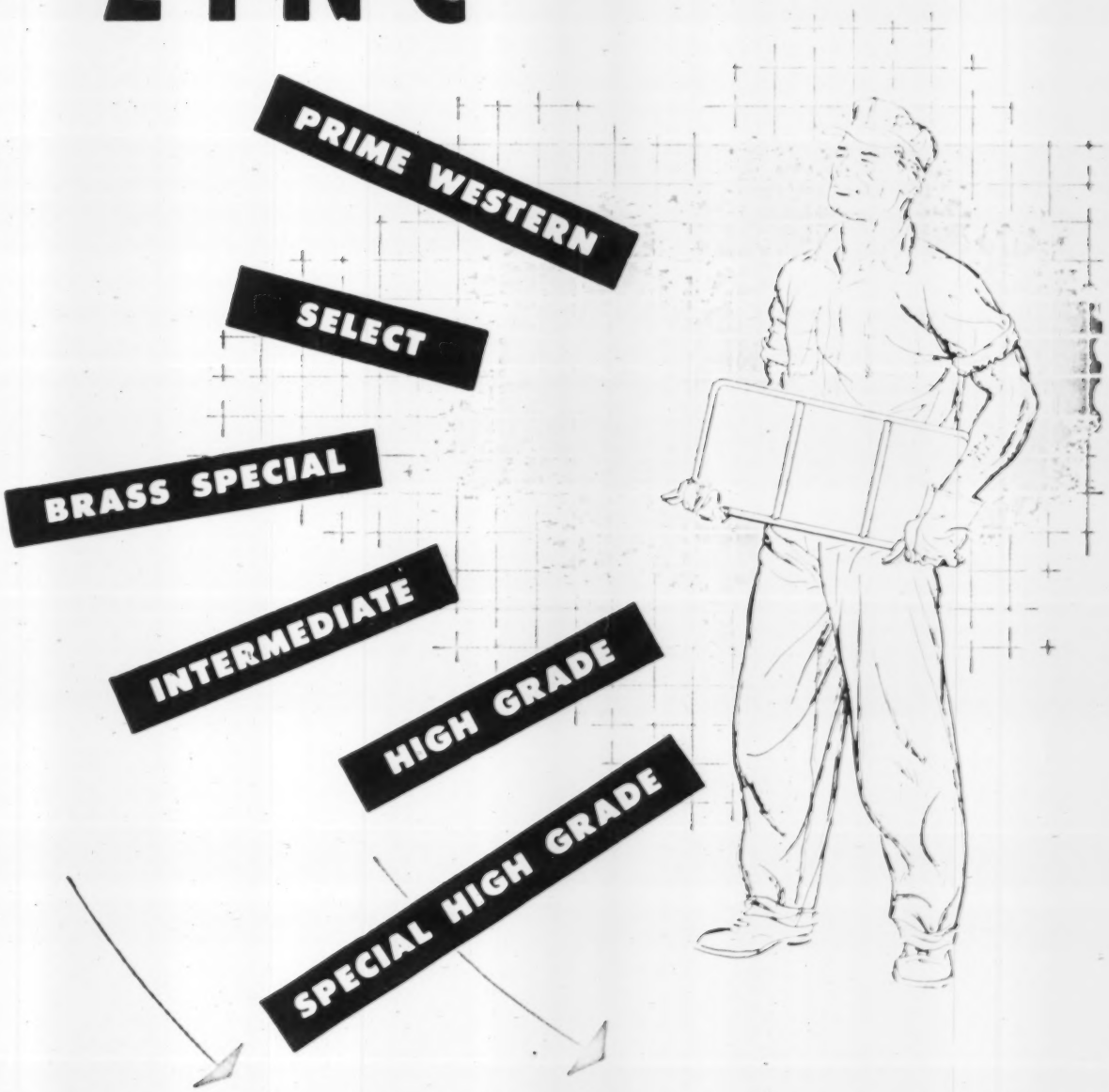

AMERICAN ZINC SALES COMPANY

Distributors for

AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, O Chicago St Louis New York

STEEL PRICES

Mill prices as reported to STEEL, cents per pound except as otherwise noted. Changes shown in italics. *Code numbers* following mill points indicate producing company; key on page 113. Key to footnotes, page 115.

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Fontana,Calif. K1 $56.00
Midland,Pa. C18 56.00

INGOTS, Alloy (NT)
Detroit R5 $62.00
Fontana,Calif. K1 84.00
Midland,Pa. C18 62.00
Munhall,Pa. U5 62.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Aliquippa,Pa. J5 $62.00
Bessemer,Pa. U5 62.00
Clifton,Pa. U5 62.00
Ensley,Ala. T2 62.00
Fairfield,Ala. T2 62.00
Fontana,Calif. K1 70.00
Gary,Ind. U5 62.00
Johnstown,Pa. B2 62.00
Lackawanna,N.Y. B2 62.00
Munhall,Pa. U5 62.00
So.Chicago,Ill. U5 62.00
So.Duquesne,Pa. U5 62.00

Carbon, Forging (NT)
Aliquippa,Pa. J5 $75.50
Beaver Falls,Pa. U5 75.50
Buffalo,N.Y. B2 75.50
Clifton,Pa. U5 75.50
Cleveland,O. R2 75.50
Conshohocken,Pa. A3 75.50
Detroit,Mich. R7 75.50
Ensley,Ala. T2 75.50
Fairfield,Ala. T2 75.50
Fontana,Calif. K1 83.50
Gary,Ind. U5 75.50
Geneva,Utah C11 75.50
Houston,Tex. S5 75.50
Johnstown,Pa. B2 75.50
Lackawanna,N.Y. B2 75.50
Los Angeles,Calif. B3 80.00
Munhall,Pa. U5 75.50
Seattle,Wash. B3 80.00
So.Chicago,Ill. R2 U5 W14 75.50
So.Duquesne,Pa. U5 75.50
So.SanFrancisco,Calif. B5 85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 $82.00
Buffalo,N.Y. B2 82.00
Canton,O. R2 T7 82.00
Conshohocken,Pa. A3 86.00
Detroit,Mich. R7 84.00
Fontana,Calif. K1 101.00
Gary,Ind. U5 82.00
Houston,Tex. S5 90.00
Ind.Harbor,Ind. Y1 82.00
Johnstown,Pa. B2 82.00
Lackawanna,N.Y. B2 82.00
Los Angeles,Calif. B3 102.00
Massillon,O. R2 82.00
Midland,Pa. C18 82.00
Munhall,Pa. U5 82.00
So.Chicago,Ill. R2 U5 W14 82.00
So.Duquesne,Pa. U5 82.00
So.SanFrancisco,Calif. B5 86.00
Struthers,O. Y1 82.00
Warren,O. C17 82.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo,N.Y. B2 $92.50
Canton,O. R2 92.50
Cleveland,O. R2 92.50
Fontana,Calif. K1 113.50
Gary,Ind. U5 92.50
Massillon,O. R2 92.50
So.Chicago,Ill. R2 92.50
So.Duquesne,Pa. U5 92.50

SHEET BAR (NT)
Fontana,Calif. K1 $93.18

SKELP
Aliquippa,Pa. J5 3.85
Munhall,Pa. U5 3.75
Warren,O. R2 3.75
Youngstown,R2, U5 3.75

WIRE RODS
Alabama City,Ala. R2 4.525
Aliquippa,Pa. J5 4.525
Alton,Ill. L1 4.70
Buffalo,N.Y. W12 4.525
Cleveland,O. A7 4.525
Donora,Pa. A7 4.525
Fairfield,Ala. T2 4.525
Fontana,Calif. K1 5.325
Houston,Tex. S5 4.925
Johnstown,Pa. B2 4.525
Kansas City,Mo. S5 4.875
Los Angeles,Calif. B3 5.125
Minnequa,Colo. C10 4.725
Monessen,Pa. P12 4.525
No.Tonawanda,N.Y. B11 4.525
Pittsburg,Calif. C11 5.175
Portsmouth,O. P12 4.525
Roebling,N.J. B5 4.625
So.Chicago,Ill. R2 4.525
Sparrows Point,Md. B2 4.625
Sterling,Ill.(1) N15 4.525
Struthers,O. Y1 4.525
Torrance,Calif. C11 5.325
Worcester,Mass. A7 4.725

STRUCTURALS

Carbon Steel Stand. Shapes
Alabama City,Ala. R2 4.10
Aliquippa,Pa. J5 4.10
Bessemer,Ala. J2 4.10
Bethlehem,Pa. B2 4.12
Clairton,Pa. U5 4.10
Fairfield,Ala. T2 4.10
Fontana,Calif. K1 4.75
Gary,Ind. U5 4.10
Houston,Tex. S5 4.30
Ind.Harbor,Ind. I-2 4.10
Johnstown,Pa. B2 4.15
Kansas City,Mo. S5 4.70
Lackawanna,N.Y. B2 4.15
Minnequa,Colo. C10 4.55
Munhall,Pa. U5 4.10
Niles,Calif. P1 4.80
Phoenixville,Pa. P4 4.15
Seattle,Wash. B3 4.85
So.Chicago,Ill. U5, W14 4.10
So.SanFrancisco,Calif. B3 4.75
Torrance,Calif. C11 4.80
Weirton,W.Va. W6 4.10

Wide Flange
Bethlehem,Pa. B2 4.15
Clairton,Pa. U5 4.10
Fontana,Calif. K1 5.10
Lackawanna,N.Y. B2 4.15
Munhall,Pa. U5 4.10
Phoenixville,Pa. P4 4.95
So.Chicago,Ill. U5 4.10

Alloy Stand. Shapes
Clairton,Pa. U5 5.00
Fontana,Calif. K1 6.40
Gary,Ind. U5 5.00
Munhall,Pa. U5 5.00
So.Chicago,Ill. U5 5.00

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 6.175
Bessemer,Ala. T2 6.175
Bethlehem,Pa. B2 6.20
Clairton,Pa. U5 6.175
Fairfield,Ala. T2 6.175
Fontana,Calif. K1 6.825
Gary,Ind. U5 6.175
Geneva,Utah C11 6.175
Ind.Harbor,Ind. I-2 6.175
Ind.Harbor,Ind. Y1 6.675
Johnstown,Pa. B2 6.20
Lackawanna,N.Y. B2 6.20
Los Angeles,Calif. B3 6.85
Munhall,Pa. U5 6.175
Seattle,Wash. B3 6.90
So.Chicago,Ill. U5, W14 6.175
So.SanFrancisco,Calif. B3 6.80
Struthers,O. Y1 6.675

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 6.20
Lackawanna,N.Y. B2 6.20
Munhall,Pa. U5 6.125
So.Chicago,Ill. U5 6.125

PILING

BEARING PILES
Munhall,Pa. U5 4.10
So.Chicago,Ill. R2 4.10

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 4.925
Lackawanna,N.Y. B2 4.925
Munhall,Pa. U5 4.925
So.Chicago,Ill. U5 4.925

PLATES

PLATES, Carbon Steel
Alabama City,Ala. R2 4.10
Aliquippa,Pa. J5 4.10
Ashland,Ky. (15) A10 4.10
Bessemer,Ala. T2 4.10
Clairton,Pa. U5 4.10
Claymont,Del. C22 4.10
Cleveland,O. R2 4.10
Coatesville,Pa. L7 4.10
Conshohocken,Pa. A3 4.10
Ecorse,Mich. G5 4.30
Fairfield,Ala. T2 4.10
Fontana,Calif. K1 4.75
Gary,Ind. U5 4.10
Geneva,Utah C11 4.10
Granite City,Ill. G4 4.30
Harrisburg,Pa. C9 4.10
Houston,Tex. S5 4.50
Ind.Harbor,Ind. I-2, Y1 4.10
Johnstown,Pa. B2 4.10
Lackawanna,N.Y. B2 4.10
Lone Star,Tex. L6 4.50
Minnequa,Colo. C10 4.55
Munhall,Pa. U5 4.10
Pittsburgh,Pa. J3 4.10
Riverdale,Ill. A1 4.10
Seattle,Wash. B3 5.00
Sharon,Pa. S3 4.10
So.Chicago,Ill. U5, W14 4.10
Sparrows Point,Md. B2 4.10
Steubenville,O. W10 4.10
Warren,O. R2 4.10
Weirton,W.Va. W6 4.10
Youngstown,R2, U5, Y1 4.10

PLATES, Carbon Abras. Resist
Fontana,Calif. K1 5.90
Geneva,Utah C11 5.25

PLATES, Wrought Iron
Economy,Pa. B14 9.30

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 6.25
Bessemer,Ala. T2 6.25
Clairton,Pa. U5 6.25
Cleveland,O. R2 6.25
Conshohocken,Pa. A3 6.25
Ecorse,Mich. G5 6.45
Fairfield,Ala. T2 6.25
Fontana,Calif.(30) K1 6.95
Gary,Ind. U5 6.25
Geneva,Utah C11 6.25
Ind.Harbor,Ind. I-2 6.25
Ind.Harbor,Ind. Y1 6.75
Johnstown,Pa. B2 6.25
Lackawanna,N.Y. B2 6.25
Munhall,Pa. U5 6.25
Pittsburgh,Pa. J3 6.25
Seattle,Wash. B3 7.15
Sharon,Pa. S3 6.25
So.Chicago,Ill. U5, W14 6.25
Sparrows Point,Md. B2 6.25
Youngstown,O. U5 6.25
Youngstown,O. Y1 6.75

PLATES, Alloy
Claymont,Del. C22 5.55
Coatesville,Pa. L7 5.55
Fontana,Calif. K1 6.60
Gary,Ind. U5 5.55
Johnstown,Pa. B2 5.55
Munhall,Pa. U5 5.55
Sharon,Pa. S3 5.55
So.Chicago,Ill. U5, W14 5.55
Sparrows Point,Md. B2 5.55

FLOOR PLATES
Cleveland,O. R2 5.15
Conshohocken,Pa. A3 5.15
Harrisburg,Pa. C9 5.15
Ind.Harbor,Ind. I-2 5.15
Munhall,Pa. U5 5.15
So.Chicago,Ill. U5 5.15

PLATES, Ingot Iron
Ashland,Ky.(15) A10 4.35
Cleveland,O.(15) A10 4.35
Cleveland,O. R2 4.70
Warren,O. R2 4.70

BARS

BARS, Hot-Rolled Carbon
Aliquippa,Pa. J5 4.15
Alton,Ill. L1 4.35
Atlanta,Ga. A11 4.40
Bessemer,Ala. T2 4.15
Birmingham,Ala. C15 4.15
Buffalo(31) R2 4.18
Clairton,Pa. U5 4.15
Cleveland(31) R2 4.21
Detroit R7 4.30
Ecorse,Mich. G5 4.35
Emeryville,Calif. J7 4.90
Fairfield,Ala. T2 4.15
Fairless,Pa. U5 4.30
Fontana,Calif. K1 4.85
Gary,Ind. U5 4.15
Gadsden,Ala.(31) R2 4.18
Houston,Tex. S5 4.55
Ind.Harbor,Ind. I-2, Y1 4.15
Johnstown,Pa. B2 4.15
Kansas City,Mo. S5 4.75
Lackawanna,N.Y. B2 4.15
Los Angeles,Calif. B3 4.85
Milton,Pa. M18 4.15
Minnequa,Colo. C10 4.60
Niles,Calif. P1 4.85
N.Tonawanda,N.Y. B11 4.15
Pittsburg,Calif. C11 4.85
Pittsburgh,Pa. J3 4.15
Portland,Oreg. O4 4.90
Seattle,Wash. B3, N14 4.90
So.Chicago,Ill. U5, W14 4.15
Chicago(31) R2 4.22
So.Duquesne,Pa. U5 4.15
So.SanFrancisco,Calif. B3 4.90
Sterling,Ill.(1) N15 4.15
Struthers,O. Y1 4.15
Torrance,Calif. C11 4.85
Weirton,W.Va. W6 4.15
Youngstown,O. U5 4.15
Youngstown,O.(31) R2 4.26

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 4.875
Buffalo,N.Y. R2 4.875
Canton,O. R2, T7 4.875
Clifton,Pa. U5 4.875
Detroit,Mich. R7 4.975
Ecorse,Mich. G5 5.075
Fairless,Pa. U5 5.025
Fontana,Calif. K1 5.925
Gary,Ind. U5 4.875
Houston,Tex. S5 5.275
Ind.Harbor,Ind. I-2, Y1 4.875
Johnstown,Pa. B2 4.875
Kansas City,Mo. S5 5.475
Lackawanna,N.Y. B2 4.875
Los Angeles,Calif. B3 5.925
Massillon,O. R2 4.875
Midland,Pa. C18 4.875
So.Chicago,Ill. R2, U5, W14 4.875
So.Duquesne,Pa. U5 4.875
Struthers,O. Y1 4.875
Warren,O. C17 4.875
Youngstown,O. U5 4.875

BARS & SMALL SHAPES, H.S. High-Strength Low-Alloy
Aliquippa,Pa. J5 6.225
Bessemer,Ala. T2 6.225
Bethlehem,Pa. B2 6.225
Clairton,Pa. U5 6.225
Ecorse,Mich. G5 6.425
Fairfield,Ala. T2 6.225
Fontana,Calif. K1 7.475
Gary,Ind. U5 6.225
Ind.Harb.,Ind. Y1 6.725
Ind.Harb.,Ind. I-2 6.225
Johnstown,Pa. B2 6.225
Lackawanna,N.Y. B2 6.225
Los Angeles,Calif. B3 6.925
Pittsburgh,Pa. J5 6.225
Seattle,Wash. B3 6.975
So.Chicago,W14 6.225
So.Duquesne,Pa. U5 6.225
So.SanFrancisco,Calif. B3 6.975
Struthers,O. Y1 6.725
Youngstown,O. U5 6.225

BAR SIZE ANGLES, H.R. CARBON
Bethlehem,Pa. B2 4.35

BAR SIZE ANGLES, S. Shapes
Aliquippa,Pa. J5 4.15
Atlanta,Ga. A11 4.35
Niles,Calif. P1 4.85
San Francisco,Calif. S7 5.10

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 5.00
Fontana,Calif. K1 5.925
Gary,Ind. U5 5.00
Houston,Tex. S5 5.60
Kansas City,Mo. S5 5.66
Youngstown,O. U5 5.00

BARS, Cold-Finished Carbon
Ambridge,Pa. W15 5.20
Beaver Falls,Pa. M12, R2 5.20
Buffalo,N.Y. B5 5.25
Camden,N.J. P13 5.65
Carnegie,Pa. C12 5.20
Chicago,Ill. W15 5.20
Cleveland,O. A7, C20 5.20
Detroit,Mich. P17, R7 5.35
Detroit,Mich. B5 5.40
Donora,Pa. A7 5.20
Elyria,O. W8 5.20
Franklin Park,Ill. N5 5.20
Gary,Ind. R2 5.20
Green Bay,Wis. F7 5.20
Hammond,Ind. I-2, M13 5.20
Hartford,Conn. R2 5.75
Harvey,Ill. B4 5.20
Los Angeles,Calif. R2 6.65
Mansfield,Mass. B5 5.75
Massillon,O. R2, R8 5.20
Monaca,Pa. S17 5.20
Newark,N.J. W15 5.65
New Castle,Pa.(17) B4 5.20
Pittsburgh,Pa. J5 5.20
Plymouth,Mich. P5 5.45
Putnam,Conn. W15 5.75
Readville,Mass. C14 5.75
St.Louis,Mo. M4 5.50
So.Chicago,Ill. W14 5.20
Spring City,Pa. K3 5.65
Struthers,O. Y1 5.20
Wankegan,Ill. A7 5.20
Worcester,Mass. W19 6.10
Youngstown,O. U5, Y1 5.20

BARS, Cold-Finished Alloy (Turned and Ground)
Cumberland,Md.(5a) C19 4.45

BARS, Cold-Finished Alloy
Ambridge,Pa. W15 6.325
Beaver Falls,Pa. M12 6.325
Bethlehem,Pa. B2 6.325
Buffalo,N.Y. B5 6.325
Camden,N.J. P13 6.50
Canton,O. R2, T7 6.325
Carnegie,Pa. C12 6.325
Chicago,Ill. W15 6.325
Cleveland,O. A7, C20 6.325
Detroit,Mich. R7 6.425
Detroit,Mich. P17 6.475
Detroit,Mich. B5 6.525
Donora,Pa. A7 6.325
Elyria,O. W8 6.325
Gary,Ind. R2 6.325
Hammond,Ind. I-2, M13 6.325
Hartford,Conn. R2 6.775
Harvey,Ill. B4 6.325
Lackawanna,N.Y. B2 6.325
Mansfield,Mass. B5 6.775
Massillon,O. R2, R8 6.325
Midland,Pa. C18 6.325
Monaca,Pa. S17 6.325
Newark,N.J. W15 6.65
Plymouth,Mich. P5 6.525
So.Chicago,Ill. R2, W14 6.325
Spring City,Pa. K3 6.50
Struthers,O. Y1 6.325
Warren,O. C17 6.325
Waukegan,Ill. A7 6.325
Worcester,Mass. A7 6.625
Youngstown,O. U5, Y1 6.325

BARS, Reinforcing (Fabricators)
Alabama City,Ala. R2 4.15
Atlanta,Ga. A11 4.35
Birmingham,Ala. C15 4.15
Buffalo,N.Y. R2 4.15
Cleveland,O. R2 4.15
Emeryville,Calif. J7 4.90
Fairfield,Ala. T2 4.15
Fairless,Pa. U5 4.30
Fontana,Calif. K1 4.85
Gary,Ind. U5 4.15
Houston,Tex. S5 4.55
Ind.Harbor,Ind. I-2, Y1 4.15
Johnstown,Pa. B2 4.15
Kansas City,Mo. S5 4.75
Lackawanna,N.Y. B2 4.15
Los Angeles,Calif. B3 4.85
Milton,Pa. M18 4.15
Minnequa,Colo. C10 4.75
Niles,Calif. P1 4.85
Pittsburg,Calif. C11 4.85
Pittsburgh,Pa. J5 4.15
Sand Springs,Okla. (Sa) 5.00
Seattle,Wash. N14 4.90
So.Chicago,Ill. R2 4.15
So.Duquesne,Pa. U5 4.15
So.SanFrancisco,Calif. B3 4.90
Sparrows Point,Md. B2 4.15
Sterling,Ill.(1) N15 4.15
Struthers,O. Y1 4.15
Torrance,Calif. C11 4.85
Youngstown,R2, U5 4.15

BARS, Reinforcing (Fabricated, to consumers)
Johnstown,Wash.,¼-1" B2 5.55
Kansas City,Mo. S5 6.35
Los Angeles,Calif. B3 5.80
Marion,O. P11 5.55
Seattle,Wash. N14 5.80
Seattle,Wash. B3 5.85
So.SanFrancisco,Calif. B3 5.85
Sparrows Pt.,Md.,¼-1" B2 5.55
Williamsport,Pa. S19 5.45

RAIL STEEL BARS
Avis,Pa.(3) J8 4.25
Chicago Hts.(3) C2, I-2 4.05
Chicago Hts.(4) C2, I-2 4.15
Ft.Worth,Tex.(26) T4 4.65
Franklin,Pa.(3) F5 4.05
Franklin,Pa.(4) F5 4.15
Marion,O.(3) P11 4.00
Moline,Ill.(3) R2 4.15
Tonawanda(3,4) B12 4.15
Williamsport,Pa.(3) S19 4.25
Williamsport,Pa.(4) S19 5.45

BARS, Wrought Iron
Economy,Pa.(S.R.) B14 10.40
Economy,Pa.(D.R.) B14 12.90
Economy(Staybolt) B14 13.20
M&K Rks.(S.R.) L5 10.40
M&K Rks.(D.R.) L5 11.00
M&K Rks(Staybolt) L5 15.50

SHEETS

SHEETS, Hot-Rolled Steel (18 gage and heavier)
Alabama City,Ala. R2 3.925
Allenport,Pa. P7 3.925
Ashland,Ky.(8) A10 3.925
Cleveland,O. R2 3.925
Conshohocken,Pa. A3 4.05
Detroit,Mich. M1 4.125
Ecorse,Mich. G5 4.125
Fairfield,Ala. T2 3.925
Fairless,Pa. U5 4.025
Fontana,Calif. K1 4.70
Gary,Ind. U5 3.925
Geneva,Utah C11 4.025
Granite City,Ill. G4 4.125
Ind.Harbor,Ind. I-2, Y1 3.925
Irvin,Pa. U5 3.925

Kokomo,Ind. C16 ... 4.025
Lackawanna,N.Y. B2 ... 3.925
Munhall,Pa. U5 ... 3.925
Newport,Ky. N9 ... 3.925
Niles,O. N12 ... 3.975
Pittsburg,Calif. C11 ... 4.625
Pittsburgh,Pa. U5 ... 3.925
Portsmouth,O. P12 ... 3.925
Riverdale,Ill. A1 ... 3.925
Sharon,Pa. S3 ... 3.925
So.Chicago,Ill. W14 ... 3.925
SparrowsPoint,Md. B2 ... 3.925
Steubenville,O. W10 ... 3.925
Torrance,Calif. C11 ... 4.625
Warren,O. R2 ... 3.925
Weirton,W.Va. W6 ... 3.925
Youngstown,O. Y1 ... 3.925

SHEETS, H.R. (19 gage)

Alabama City,Ala. R2 ... 5.225
Dover,O. R1 ... 5.05
Kokomo,Ind. C16 ... 5.025
Mansfield,O. E6 ... 5.05
Niles,O. N12 ... 4.775
Torrance,Calif. C11 ... 5.575

SHEETS, H.R. (14 ga. heavier) High-Strength Low-Alloy

Cleveland,O. R2 ... 5.90
Conshohocken,Pa. A3 ... 5.90
Ecorse,Mich. G5 ... 6.10
Fairfield,Ala. T2 ... 5.90
Fontana,Calif. K1 ... 6.675
Gary,Ind. U5 ... 5.90
Ind Harbor,Ind. I-2 ... 5.90
Ind Harbor,Ind. Y1 ... 6.40
Irvin,Pa. U5 ... 5.90
Lackawanna(35),Pa. B2 ... 5.90
Munhall,Pa. U5 ... 5.90
Pittsburgh,Pa. J5 ... 5.90
Sharon,Pa. S3 ... 5.90
So.Chicago,Ill. U5 ... 5.90
SparrowsPoint(36) B2 ... 5.90
Warren,O. R2 ... 5.90
Weirton,W.Va. W6 ... 5.90
Youngstown,O. U5 ... 5.90
Youngstown,O. Y1 ... 6.40

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ... 4.175
Cleveland,O. R2 ... 4.525
Ind Harbor,Ind. I-2 ... 4.175
Warren,O. R2 ... 4.525

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 ... 4.775
Cleveland,O. R2 ... 4.775
Ecorse,Mich. G5 ... 4.975
Fairfield,Ala. T2 ... 4.775
Fairless,Pa. U5 ... 4.875
Follansbee,W.Va. F4 ... 4.775
Fontana,Calif. K1 ... 5.875
Gary,Ind. U5 ... 4.775
Granite City,Ill. G4 ... 4.975
Ind Harbor,Ind. I-2,Y1 ... 4.775
Irvin,Pa. U5 ... 4.775
Lackawanna,N.Y. B2 ... 4.775
Middletown,O. A10 ... 4.775
Pittsburg,Calif. C11 ... 5.725
Pittsburgh,Pa. J5 ... 4.775
Portsmouth,O. P12 ... 4.775
SparrowsPoint,Md. B2 ... 4.775
Steubenville,O. W10 ... 4.775
Warren,O. R2 ... 4.775
Weirton,W.Va. W6 ... 4.775
Youngstown,O. Y1 ... 4.775

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland,O. R2 ... 7.225
Ecorse,Mich. G5 ... 7.425
Fontana,Calif. K1 ... 8.275
Gary,Ind. U5 ... 7.225
Indiana Harbor,Ind. Y1 ... 7.725
Irvin,Pa. U5 ... 7.225
Lackawanna(37),Pa. B2 ... 7.225
Pittsburgh,Pa. J5 ... 7.225
SparrowsPoint,(38) B2 ... 7.225
Warren,O. R2 ... 7.225
Weirton,W.Va. W6 ... 7.225
Youngstown,O. Y1 ... 7.725

SHEETS, Cold-Rolled Ingot Iron

Cleveland,O. R2 ... 5.375
Middletown,O. A10 ... 5.275
Warren,O. R2 ... 5.375

SHEETS, Culvert

	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.325	
Canton,O. R2	6.475	6.925
Fairfield,Ala. T2	6.075	6.525
Gary,Ind. U5	6.075	6.525
Ind Harbor,Ind. I-2	6.075	6.525
Irvin,Pa. U5	6.075	6.525
Kokomo,Ind. C16	6.175	
Martins Ferry,O. W10	6.075	
Pittsburg,Calif. C11	6.825	
Sparrows Pt. B2	6.075	
Torrance,Cal. C11	7.975	

SHEETS, Culvert

	Pure Iron
Ashland,Ky. A10	6.375
Fairfield,Ala. T2	6.325
Martins Ferry,O. W10	6.325

SHEETS, Gal'd No. 10 Steel

Alabama City,Ala. R2 ... 5.275
Ashland,Ky.(8) A10 ... 5.275
Canton,O. R2 ... 5.275
Delphos,O. N16 ... 5.775
Dover,O. R1 ... 5.275
Fairfield,Ala. T2 ... 5.275†
Gary,Ind. U5 ... 5.275†
Granite City,Ill. G4 ... 5.475
Ind Harbor,Ind. I-2 ... 5.275
Irvin,Pa. U5 ... 5.275†
Kokomo,Ind. C16 ... 5.375†
Martins Ferry,O. W10 ... 5.275
Niles,O. N12 ... 5.275
Pittsburg,Calif. C11 ... 6.025
SparrowsPoint,Md. B2 ... 5.275
Steubenville,O. W10 ... 5.275†
Torrance,Calif. C11 ... 6.275†
Weirton,W.Va. W6 ... 5.275

†Based on 5c zinc

SHEETS, Galvanized No. 10 High-Strength Low-Alloy

Irvin,Pa. U5 ... 7.925
SparrowsPoint(39) B2 ... 8.075

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10 ... 5.525
Canton,O. R2 ... 6.025

SHEETS, Galvannealed Steel

Canton,O. R2 ... 5.825
Irvin,Pa. U5 ... 5.825†
Kokomo,Ind. C16 ... 5.925†
Niles,O. N12 ... 5.825

†Based on 5c zinc

SHEETS, ZINCGRIP Steel

Butler,Pa. A10 ... 5.525
Middletown,O. A10 ... 5.525

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10 ... 5.775
Middletown,O. A10 ... 5.775

SHEETS, Electrogalvanized

Cleveland R2 (28) ... 6.125
Niles,O. R2 (28) ... 6.125
Weirton,W.Va. W6 ... 5.975

SHEETS, ALUMINIZED

Butler,Pa. A10 ... 8.625

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ... 5.175
Cleveland R2 ... 5.175
Gary,Ind. U5 ... 5.175
Granite City,Ill. G4 ... 5.375
Ind Harbor,Ind. I-2 ... 5.175
Irvin,Pa. U5 ... 5.175
Middletown,O. A10 ... 5.175
Niles,O. N12 ... 6.525
Youngstown,O. Y1 ... 5.175

BLUED STOCK, 29 ga.

Follansbee,W.Va. F4 ... 7.30
Follansbee(23) F4 ... 7.175
Yorkville,O. W10 ... 7.20

SHEETS, Long Terne Steel (Commercial Quality)

Beech Bott'm,W.Va. W10 5.675
Gary,Ind. U5 ... 5.675
Mansfield,O. E6 ... 5.675
Middletown,O. A10 ... 5.675
Niles,O. N12 ... 5.675
Weirton,W.Va. W6 ... 5.675

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ... 6.075

SHEETS, Well Casing

Fontana,Calif. K1 ... 6.20

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ... 3.925
Allenport,Pa. P7 ... 3.925
Alton,Ill. L1 ... 4.10
Ashland,Ky.(8) A10 ... 3.925
Atlanta,Ill. A11 ... 4.125
Bessemer,Ala. T2 ... 3.925
Birmingham,Ala. C13 ... 3.925
Bridgeport,Conn.(10) S15 3.95
Buffalo(27) R2 ... 3.925
Carnegie,Pa. S18 ... 4.425
Conshohocken,Pa. A3 ... 4.05
Detroit,Mi. M1 ... 4.125
Ecorse,Mich. G5 ... 4.125
Fairfield,Ala. T2 ... 3.925
Fontana,Calif. K1 ... 4.70
Gary,Ind. U5 ... 3.925
Houston,Tex. S5 ... 4.325
Ind Harbor,Ind. I-2,Y1 3.925
Johnstown,Pa.(25) B2 3.925
Kansas City,Mo.(9) S5 ... 4.525
Lackawanna,N.Y.(25) B2 3.925
Los Angeles(25) B3 ... 4.675
Milton,Pa. M18 ... 3.925
Minnequa,Colo. C10 ... 5.025
New Britain(10) S15 ... 4.15
N.Tonawanda,N.Y. B11 3.925
Pittsburg,Calif. C11 ... 4.675
Portsmouth,O. P12 ... 3.925
Riverdale,Ill. A1 ... 3.925
San Francisco 87 ... 5.10
Seattle(25) B3 ... 4.925
Seattle,Wash. N11 ... 4.925
Sharon,Pa. S3 ... 3.925
So.Chicago,Ill. W14 ... 3.925
So.SanFrancisco(25) B3 4.675
SparrowsPoint,Md. B2 ... 3.925
Torrance,Calif. C11 ... 4.675
Warren,O. R2 ... 3.925
Weirton,W.Va. W6 ... 3.925
Youngstown,O. U5 ... 3.925

STRIP, Hot-Rolled Alloy

Bridgeport,Conn.(10) S15 6.45
Carnegie,Pa. S18 ... 6.40
Fontana,Calif. K1 ... 7.80
Gary,Ind. U5 ... 6.40
Houston,Tex. S5 ... 6.80
Kansas City,Mo. S5 ... 7.00
Los Angeles,B3 ... 7.60
New Britn. Conn.(10) S15 6.45
Sharon,Pa. S3 ... 6.40
So.Chicago,W14 ... 6.40
Youngstown,O. U5 ... 6.40

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 ... 5.95
Conshohocken,Pa. A3 ... 5.90
Ecorse,Mich. G5 ... 6.15
Fairfield,Ala. T2 ... 5.95
Fontana,Calif. K1 ... 7.05
Gary,Ind. U5 ... 5.95
Ind Harbor,Ind. I-2 ... 5.95
Ind Harbor,Ind. Y1 ... 6.45
Lackawanna,N.Y. B2 ..6.00
Los Angeles(25) B3 ... 6.70
Seattle(25) B3 ... 6.95
Sharon,Pa. S3 ... 5.95
So.SanFrancisco(25) B3 6.70
SparrowsPoint,Md. B2 ... 6.00
Warren,O. R2 ... 5.95
Weirton,W.Va. W6 ... 5.95
Youngstown,O. Y1 ... 6.45
Youngstown,O. U5 ... 5.95

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ... 4.175
Warren,O. R2 ... 4.525

STRIP, Cold-Rolled Carbon

Anderson,Ind. G5 ... 5.45
Bridgeprt,Conn.(10) S15 5.45
Cleveland,O. R2 ... 5.40
Dearborn,Mich. D3 ... 5.65
Detroit D2, M1, P20 ... 5.65
Dover,O. O6 ... 5.45
Ecorse,Mich. G5 ... 5.65
Follansbee,W.Va. F4 ... 5.45
Fontana,Calif. K1 ... 7.35
Franklin Park,Ill. T6 ... 5.70
Ind Harbor,Ind. I-2 ... 5.70
Indianapolis,Ind. C8 ... 5.60
Lackawanna,N.Y. B2 ... 5.45
Los Angeles,C1 ... 7.50
Mattapan,Mass. T6 ... 6.10
Middletown,O. A10 ... 5.45
New Bedford,Mass. R10 ... 6.00
New Britain(10) S15 ... 5.75
New Castle,Pa. B4, E5 ... 5.45
New Haven,Conn. A7 ... 6.20
New Haven,Conn. D2 ... 5.90
Pawtucket,R.I. N8, R3 ... 6.10
Pittsburgh,Pa. J5 ... 5.45
Riverdale,Ill. A1 ... 5.70
Rome,N.Y.(29), R6 ... 5.45
Sharon,Pa. S3 ... 5.45
SparrowsPoint,Md. B2 ... 5.45
Trenton,N.J. R5 ... 7.00
Wallingford,Conn. W2 ... 5.90
Warren,O.(40) T5 ... 5.45
Warren,O. B9, R2 ... 5.45
Weirton,W.Va. W6 ... 5.45
Worcester,Mass. A7 ... 6.30
Youngstown,O. S, Y1 ... 5.45

STRIP, Cold-Rolled Alloy Steel

Carnegie,Pa. S18 ... 12.00
Cleveland,O. A7 ... 12.00
Dover,O. O6 ... 12.00
Fontana,Calif. K1 ... 13.65
Harrison,N.J. C18 ... 12.00
Pawtucket,R.I.(41) N8 12.15
Pawtucket,R.I.(42) N8 12.45
Sharon,Pa. S3 ... 12.00
Worcester,Mass. A7 ... 12.30
Youngstown,O. S ... 12.00

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland,O. A7 ... 7.80
Cleveland,O. A7 ... 8.15
Dearborn,Mich. D3 ... 7.90
Dover,O. O6 ... 8.00
Ecorse,Mich. G5 ... 8.35
Lackawanna,N.Y. B2 ... 8.15
Pittsburgh,Pa. J5 ... 7.80
Sharon,Pa. S3 ... 7.65
Sparrows Point,Md. B2 ... 8.15
Warren,O. R2 ... 7.60
Weirton,W.Va. W6 ... 8.15
Youngstown,O. Y1 ... 8.30

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 ... 6.05

STRIP, Electrogalvanized

Dover,O. O6 ... 5.45
Warren,O. B9, T5 ... 5.45
Weirton,W.Va. W6 ... 5.45
Youngstown,O. S ... 5.70

TIGHT COOPERAGE HOOP

Atlanta,Ill. ... 4.65
Riverdale,Ill. A1 ... 4.50
Sharon,Pa. S3 ... 4.35
Youngstown,O. S ... 4.35

Key to Producers

A1 Acme Steel Co.
A3 Allan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angel Nail & Chapel
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Div., Colorado Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Div., H. K. Porter Co.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div., Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Products
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Gas&Fuel Assoc.
E3 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Fitz Sterling Inc.
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J2 Jessop Steel Co.
J4 Johnson Steel&Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Pipe Div. Sawhill Tubular Products
M8 Mid States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M16 Mt. Fire & Special Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott
N2 National Supply Co.
N3 National Tube Div.
N5 Nelson Steel & Wire Co.
N6 New Eng. High Carb Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div.
N14 Northwest Steel Roll Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O1 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P4 Phoenix Iron & Steel Co.
P6 Pilgrim Drawn Steel
P8 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P20 Prod. Steel Strip Corp.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S25 Stainless Welded Products
S26 Specialty Wire Co. Inc.

T2 Tenn. Coal & Iron Div.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T8 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U1 Universal Cyclops Steel
U4 United States Steel Corp.
U6 U. S. Pipe & Foundry

V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West Auto Mach Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP, Cold-Finished	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Spring Steel (Annealed)					
Berea,O. C7		8.60	8.60	10.55	12.85
Bridgeport,Conn.(10) S15	5.45	7.65	8.60	10.55	12.85
Bristol,Conn. W1			8.90	10.85	
Carnegie,Pa. S18		7.65	8.60	10.55	12.85
Cleveland A7	5.45	7.65	8.60	10.55	12.85
Dearborn,Mich. D3	5.65	7.85	8.80		
Detroit U2	5.65	7.85	8.80	10.55	
Dover,O. G6	5.45	7.65	8.60	10.55	12.85
FranklinPark,Ill. T6	5.70	7.80	8.75	10.70	13.00
Harrison,N.J. C18			8.90	10.85	13.15
Indianapolis C8		7.80	8.60	10.55	
Mattapan,Mass. T6	6.10	7.95	8.90	10.85	13.15
NewBritn.,Conn.(10) S15	5.75	7.65	8.60	10.55	12.85
NewCastle,Pa. B4	5.45	7.65	8.60		
NewCastle,Pa. E5	5.45	8.00	8.60	10.55	12.85
NewHaven,Conn. J12	5.90	7.95	8.90	10.85	
NewYork W3		7.95	8.90	10.85	13.15
Pawtucket,R.I.(11) N8		7.65	8.60	10.55	12.85
Pawtucket,R.I.(12) N8	6.10	7.95	8.90	10.85	13.15
Sharon,Pa. S3	5.45	7.65	8.60	10.55	12.85
Trenton,N.J. R5		7.95	8.90	10.85	13.15
Wallingford,Conn. W2	5.90	7.95	8.90	10.85	13.15
Warren,O. T5	5.45	7.65	8.60	10.55	12.85
Weirton,W.Va. W6	5.45	7.65	8.60	10.55	12.85
Worcester,Mass. A7	6.30	7.95	8.90	10.85	13.15
Worcester,Mass. T6	6.10	7.95	8.90	10.85	13.15
Youngstown C8		7.65	8.60	10.55	12.85
Spring Steel (Tempered)					
Buffalo W12			12.50		
Bristol,Conn. W1			12.50	15.00	
FranklinPark,Ill. T6			13.25	15.75	18.75
Harrison,N.J. C18			12.50	15.00	18.00
NewYork W3			12.50	15.00	18.00
Trenton,N.J. R5			12.50	15.00	18.00
Worcester,Mass. T6			12.50	15.00	18.00
Worcester,Mass. W12			12.50		
Youngstown C8			12.50	15.00	18.00

SILICON STEEL

H.R. SHEETS (22 gage) (Cut Lengths)	Field	Arma-tures	Elec-tric	Motor	Dyna-mo
BeechBottom,W.Va. W10			8.75	9.75	10.65
Brackenridge,Pa. A4			8.75	9.75	10.65
IndianaHarbor,Ind. I-2	7.85	8.15	8.75	9.75	
Mansfield,O. E6	7.85	8.15	8.75	9.75	10.65
Newport,Ky. N9	7.85	8.15	8.75	9.75	10.65
Niles,O. N12	7.85	8.15	8.75	9.75	
Vandergrift,Pa. U5		8.15	8.75	9.75	10.65
Warren,O. R2	7.85	8.15	8.75	9.75	
Zanesville,O. A10		8.15	8.75	9.75	10.65

C.R. COILS & CUT LENGTHS, (22 Ga.) Fully Processed (Semi processed ½c lower)	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
GraniteCity,Ill. G4	8.25*	8.60*	9.20*	10.20*	
IndianaHarbor,Ind. I-2	8.05	8.40*	9.00*		
Vandergrift,Pa. U5	8.05*	8.90	9.50	10.50	11.40
Warren,O. R2	8.05†	8.90	9.50	10.50	11.40

H.R SHEETS (22 Gage) (Cut Lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	11.60	12.15	12.65	13.65
Brackenridge,Pa. A4	11.60			
Newport,Ky. N9	11.60			
Vandergrift,Pa. U5	11.60	12.15	12.65	13.65
Zanesville,O. A10	11.60	12.15	12.65	13.65

C.R. COILS & CUT LENTGHS (22 Ga.)	T-100	T-90	T-80	T-73	T-72
Butler,Pa. A10			16.25	16.75	
Vandergrift,Pa. U5	13.65	14.65	16.25	16.75	12.35†
Warren,O. R2					12.35†

*Semiprocessed. †Fully processed only. ‡Coils annealed; semiprocessed ½c lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.75 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.40	$7.65	$8.05
Fairfield,Ala. T2	7.50	7.75	8.15
Fairless,Pa. U5	7.50	7.75	8.15
Gary,Ind. U5	7.40	7.65	8.05
GraniteCity,Ill. G4	7.60	7.85	8.25
IndianaHarbor,Ind. I-2, Y1	7.40	7.65	8.05
Irvin,Pa. U5	7.40	7.65	8.05
Niles,O. R2	7.40	7.65	8.05
Pittsburg,Calif. C11	8.15	8.40	8.80
SparrowsPoint,Md. B2	7.50	7.75	8.15
Weirton,W.Va. W6	7.40	7.65	8.05
Yorkville,O. W10	7.40	7.65	8.05

TIN PLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$8.70	$8.95
Fairfield,Ala. T2	8.80	9.05
Fairless,Pa. U5	8.80	9.05
Gary,Ind. U5	8.70	8.95
Ind.Har. I-2, Y1	8.70	8.95
Irvin,Pa. U5	8.70	8.95
Pitts.Cal. C11	9.45	9.70
Sp.Pt.,Md. B2	8.80	9.05
Warren,O. R2	8.70	8.95
Weirton,W.Va. W6	8.70	8.95
Yorkville,O. W10	8.70	8.95

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$6.50
Fairfield,Ala. T2	6.60
Fairless,Pa. U5	6.60
Gary,Ind. U5	6.50
GraniteCity,Ill. G4	6.70
Ind.Harbor,Ind. I-2, Y1	6.50
Irvin,Pa. U5	6.50
Niles,O. R2	6.50
Pittsburg,Calif. C11	7.25
SparrowsPoint,Md. B2	6.60
Warren,O. R2	6.50
Weirton,W.Va. W6	6.50
Yorkville,O. W10	6.50

HOLLOWARE ENAMELING Black Plate (29 gage)	
Follansbee,W.Va. F4	6.10
Gary,Ind. U5	6.10
GraniteCity,Ill. G4	6.30
Ind.Harbor,Ind. Y1	6.10
Irvin,Pa. U5	6.10
Yorkville,O. W10	6.10

MANUFACTURING TERNES (Special Coated)	
Fairfield,Ala. T2	$7.85
Gary,Ind. U5	7.75
Irvin,Pa. U5	7.75
Yorkville,O. W10	7.75

MANUFACTURING TERNES, 8 lb (Commercial Quality)	
Gary,Ind. U5	$9.75
Yorkville,O. W10	9.75

MANUFACTURING TERNES, LT. Coated, 6 lb	
Yorkville,O. W10	$8.65

ROOFING SHORT TERNES (8 lb Coated)	
Gary,Ind. U5	9.75

WIRE

WIRE, Manufacturers Bright, Low Carbon	
AlabamaCity,Ala. B2	5.525
Aliquippa,Pa. J5	5.525
Alton,Ill. L1	5.70
Atlanta A11	5.725
Bartonville,Ill. K4	5.625
Buffalo W12	5.525
Chicago W13	5.525
Cleveland A7, C20, R2	5.525
Crawfordsville,Ind. M8	5.625
Donora,Pa. A7	5.525
Duluth,Minn. A7	5.525
Fairfield,Ala. T2	5.525
Fostoria,O. (24) S1	5.75
Houston S5	5.625
Jacksonville,Fla. M8	6.05
Johnstown,Pa. B2	5.525
Joliet,Ill. A7	5.525
KansasCity,Mo. S5	6.125
Kokomo,Ind. C16	5.625
LosAngeles B3	6.475
Minnequa,Colo. C10	5.775
Monessen,Pa. P7	5.525
No.Tonawanda B11	5.525
Palmer,Mass. W12	5.825
Pittsburg,Calif. C11	6.475
Portsmouth,O. P12	5.525
Rankin,Pa. A7	5.525
So.Chicago,Ill. R2	5.525
So.SanFrancisco C10	6.475
SparrowsPoint,Md. B2	5.625
Sterling,Ill.(1) N15	5.525
Struthers,O. Y1	5.525
Waukegan,Ill. A7	5.525
Worcester,Mass. A7	5.825

WIRE, MB Spring, High Carbon	
Aliquippa,Pa. J5	6.925
Alton,Ill. L1	7.10
Bartonville,Ill. K4	7.025
Buffalo W12	6.925
Cleveland A7	6.925
Donora,Pa. A7	6.925
Duluth,Minn. A7	6.925
Fostoria,O. S1	6.925
Johnstown,Pa. B2	6.925
LosAngeles B3	7.875
Millbury,Mass.(12) N6	7.225
Minnequa,Colo. C10	7.175
Monessen,Pa. P7, P16	6.925
Muncie,Ind. I-7	7.125
Palmer,Mass. W12	7.225
Pittsburg,Calif. C11	7.875
Portsmouth,O. P12	6.925
RoeblingN.J. R5	7.225
So.Chicago,Ill. R2	6.925
So.SanFran. C10	7.875
SparrowsPt., Md. B2	7.025
Struthers,O. Y1	6.925
Trenton,N.J. A7	7.225
Waukegan,Ill. A7	6.925
Worcester A7, J4	7.225
Worcester T6, W12	7.225

WIRE, Upholstery Spring	
Aliquippa,Pa. J5	6.625
Alton,Ill. L1	6.80
Buffalo W12	6.625
Cleveland A7	6.625
Donora,Pa. A7	6.625
Duluth,Minn. A7	6.625
Johnstown,Pa. B2	6.625
LosAngeles B3	7.575
Minnequa,Colo. C10	6.80
Monessen,Pa. P7, P16	6.625
Newhaven,Conn. A7	6.925
Palmer,Mass. W12	6.925
Pittsburg,Calif. C11	7.575
Portsmouth,O. P12	6.625
Roebling,N.J. R5	6.925
So.Chicago,Ill. R2	6.625
So.SanFrancisco C10	7.575
SparrowsPoint,Md. B2	6.725
Trenton,N.J. A7	6.925
Waukegan,Ill. A7	6.625
Worcester,Mass. A7	6.925

WIRE, Fine & Weaving(8"Coils)	
Alton,Ill. L1	10.75
Bartonville,Ill. K4	10.65
Buffalo W12	10.55
Chicago W13	10.55
Cleveland A7	10.55
Crawfordsville,Ind. M8	10.65
Fostoria,O. S1	10.55
Jacksonville,Fla. M8	11.08
Johnstown,Pa. B2	10.55
Kokomo,Ind. C16	10.55
Minnequa,Colo. C10	10.30
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.85
Roebling,N.J. R5	10.85
So.SanFrancisco C10	10.90
Waukegan,Ill. A7	10.55
Worcester,Mass. A7,T6	10.85

WIRE, Galv'd ACSR for Cores	
Bartonville,Ill. K4	9.50
Buffalo W12	9.50
Johnstown,Pa. B2	9.50
Minnequa,Colo. C10	9.625
Monessen,Pa. P16	9.50
Muncie,Ind. I-7	9.70
Roebling,N.J. R5	9.50
SparrowsPt.,Md. B2	9.60

ROPE WIRE	(A)
Alton,Ill. L1	9.45
Bartonville,Ill. K4	9.35
Buffalo W12	9.35
Fostoria,O. S1	9.35
Johnstown,Pa. B2	9.35
Monessen,Pa. P7, P16	9.35
Muncie,Ind. I-7	9.55
Palmer,Mass. W12	9.65
Portsmouth,O. P12	9.35
Roebling,N.J. R5	9.65
SparrowsPt. B2	9.45
Struthers,O. Y1	9.35
Worcester J4, T6	9.65

(A) Plow and Mild Plow; add 0.25c for improved plow.

WIRE, Tire Bead	
Alton,Ill. L1	12.75
Bartonville,Ill. K4	12.65
Monessen,Pa. P16	12.55
Roebling,N.J. R5	12.85

WIRE,Cold-Rolled Flat	
Anderson,Ind. G6	7.45
Buffalo W12	7.45
Cleveland A7	7.45
Crawfordsville,Ind. M8	7.55
Dover,O. G6	7.45
Fostoria,O. S1	7.45
Kokomo,Ind. C16	7.55
FranklinPark,Ill. T6	7.60
Massillon,O. R8	7.45
Monessen,Pa. P7, P16	7.45
Pawtkt.,R.I.(12) N8	7.75
Trenton,N.J. R5	7.75
Worcester A7, T6, W12	7.75

WIRE, Merchant Quality (6 to 8 gage)	An'ld. Galv.
Ala.City R2	6.675 7.075**
Aliquippa J5	6.675 7.20*
Atlanta A11	6.775 7.30
Bartonville(48)K4	6.775 7.275
Buffalo W12	6.675 7.075†
Cleveland A7	6.675
Crawfordsville M8	6.775 7.30
Donora,Pa. A7	6.675 7.075†
Duluth,Minn. A7	6.675 7.075†
Fairfield T2	6.675 7.075†
Houston,Tex. S5	7.075 7.475
Jacksonville,Fla. M8	7.20 7.73
Johnstown B2(48)	6.675 7.225*
Joliet,Ill. A7	6.675 7.075†
KansasCity,Mo. S5	7.275 7.675
Kokomo C16	6.775 7.175†
LosAngeles B3	7.625
Minnequa C10	6.925 7.326**
Monessen P7(48)	6.675 7.225
Palmer W12	6.775 7.375†
Pitts.,Calif. C11	7.625 8.025†
Portsmouth,O.P12	6.675
Rankin A7	6.675 7.075†
So.Chi'go R2	6.675 7.075**
S.S.Frn.(48)C10	7.625 8.025**
Spar'wsPt.B2(48)	6.775 7.325*
Sterl'g(1)(48)N15	6.675 7.175
Struthers,O. Y1	6.675 7.175
Worcester A7	6.975

* Based on 10c zinc; † 5c zinc; ** Subject to zinc equalization extras.

WOVEN FENCE, 9-15½ Ga. Col.	
Ala.City,Ala. R2	140**
Ala.City, 17 ga. R2	230**
Ala.City 18 ga. R2	240**
Aliq'ppa,Pa.9-14½ga. J5	143*
Atlanta A11	145
Bartonville,Ill. K4	144
Crawfordsville,Ind. M8	145
Donora,Pa. A7	140†
Duluth,Minn. A7	140†
Fairfield,Ala. T2	140†
Houston,Tex. S5	148
Johnstown,Pa. B2	143
Johnstown 17 ga.,6"B2	234
Johnstown 4" B2	237
Joliet,Ill. A7	140†
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142†
Minnequa,Colo. C10	148**
Monessen,Pa. 9 ga. P7	145
Pittsburg,Calif. C11	163†
Rankin,Pa. A7	140†
So.Chicago,Ill. R2	140**
Sterling,Ill. (1) N15	142

† Based on 5c zinc; * 11c zinc; ** Subject to zinc equalization extras.

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	149
Atlanta A11	151
Bartonville,Ill. K4	151
Crawfordsville,Ind. M8	151
Donora,Pa. A7	149
Duluth,Minn. A7	149
Fairfield,Ala. T2	149
Joliet,Ill. A7	149
KansasCity,Mo. S5	161
Kokomo,Ind. C16	151
Minnequa,Colo. C10	154
Pittsburg,Calif. C11	173
So.Chicago,Ill. R2	149
So.SanFran.,Calif. C10	173
SparrowsPoint,Md. B2	151
Sterling,Ill.(1) N15	149

WIRE, Barbed	Col.
AlabamaCity R2	153**
Aliquippa J5	150*
Atlanta A11	158
Bartonville,Ill. K4	157
Crawfordsville,Ind. M8	158
Donora,Pa. A7	153†
Duluth,Minn. A7	153†
Fairfield,Ala. T2	153†
Houston,Tex. S5	161
Johnstown,Pa. B2	156*
Joliet,Ill. A7	153†
KansasCity,Mo. S5	165
Kokomo,Ind. C16	155†
Minnequa,Colo. C10	159**
Monessen,Pa. P7	157
Pittsburg,Calif. C11	173†
Rankin,Pa. A7	153†
So.Chicago,Ill. R2	153**
S.SanFrancisco C10	176**
SparrowsPoint,Md. B2	158*
Sterling,Ill. (1) N15	155

* Based on 5c zinc; † 11c zinc; ** Subject to zinc equalization extras.

NAILS, STOCK	An'ld. Galv. Stone	Stone
To dealers & mfrs. (7)	Col.	
WIRE, (16gage)		
Ala.City R2	12.50	14.05**
Aliquippa J5	12.50	14.30*
Bartonville K4	12.60	14.35
Buffalo W12	12.50	
Cleveland A7	12.50	
CrawfordsvilleM8	12.50	14.30
Fostoria,O. S1	12.60	14.15
Johnstown B2	12.50	14.35*
Kokomo C16	12.60	14.15†
Minnequa C10	12.75	14.45**
Palmer,Mas W12	12.50	14.05†
Pitts.,Calif. C11	12.85	14.40†
SparrowsPt. B2	12.60	14.45*
Sterling(1) N15	12.50	14.25
Waukegan A7	12.50	14.05†
Worcester A7	12.80	

* Based on 11c zinc; † 5c zinc; ** Subject to zinc equalization extras.

NAILS, STOCK	Col.
To dealers & mfrs. (7)	
AlabamaCity,Ala. R2	131
Aliquippa,Pa. J5	131
Atlanta A11	133
Bartonville,Ill. K4	133
Chicago,Ill. W13	131
Cleveland A9	137
Crawfordsville,Ind. M8	133
Donora,Pa. A7	131
Duluth,Minn. A7	131
Fairfield,Ala. T2	131
Galveston,Tex. D7	139
Houston,Tex. S5	139
Johnstown,Pa. B2	131
Joliet,Ill. A7	131
KansasCity,Mo. S5	143
Kokomo,Ind. C16	133
Minnequa,Colo. C10	136
Monessen,Pa. P7	131
Pittsburg,Calif. C11	150
Rankin,Pa. A7	131
So.Chicago,Ill. R2	131
SparrowsPt.,Md. B2	133
Sterling,Ill. (1) N15	131
Worcester,Mass. A7	137

NAILS, CUT (100 lb keg)	
To dealers (33)	
Conshohocken,Pa. A3	$8.00
Wheeling,W.Va. W10	8.00

STAPLES, Polished Stock	Col.
To dealers & mfrs. (7)	
AlabamaCity,Ala. R2	133
Aliquippa,Pa. J5	133
Atlanta A11	135
Bartonville,Ill. K4	135
Crawfordsville,Ind. M8	135
Donora,Pa. A7	133
Duluth,Minn. A7	133
Fairfield,Ala. T2	133
Johnstown,Pa. B2	133
Joliet,Ill. A7	133
Kokomo,Ind. C16	135
Minnequa,Colo. C10	138
Monessen,Pa. P7	133
Pittsburg,Calif. C11	152
Rankin,Pa. A7	133
So.Chicago,Ill. R2	133
SparrowsPt.,Md. B2	135
Sterling,Ill. (1) N15	133
Worcester,Mass. A7	139

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2, I-2	145
Duluth,Minn. A7 (49)	145
Franklin,Pa. F5	145
Johnstown,Pa. B2	145
Marion,O. F11	145
Minnequa,Colo. C10	150
Moline,Ill. R2	145
So.Chicago,Ill. R2	145
Tonawanda,N.Y. B12	145
Williamsport,Pa. S19	148

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Sizes—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	15.75	list	19.75	2.5	22.25	5	23.75	6.5	23.75	6.5	23	5.75	25.5	8.25
Ambridge, Pa. N2 (†)	15.75	...	19.75	...	22.25	...	23.75	...	23.75	...	23	...	25.5	...
Lorain, O. N3 (*)	15.75	4.5	19.75	5.5	22.25	8	23.75	9.5	23.75	9.5	23	8.75	25.5	11.25
Youngstown Y1 (††)	15.75	list	19.75	2.5	22.25	5	23.75	6.5	23.75	6.5	23	5.75	25.5	8.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2 (**)	15.75	1.5	19.75	3.5	22.25	6.0	23.75	7.5	23.75	7.5	23	7.5	25.5	6.75

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼		1½	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c		27.5c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28		2.73	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	...	...	...	...	...	...	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5
Alton, Ill. L1 (§)	...	...	...	...	...	...	24.25	9	27.25	13	29.75	16.5	32.25	17.5	32.75	18.25
Benwood, W. Va. W10(††)	25.5	+0.25	17.75	+5.5	10.25	+10	26.25	11	29.25	15	31.75	18.5	34.25	19.5	34.75	20.25
Butler, Pa. F6	26.5	—1.75	19.5	+2.75	12.5	+6.25	...	...	...	...	...	...	...	...	...	...
Etna, Pa. N2 (†)	...	...	...	...	...	...	26.25	7	29.25	11	31.75	14.5	34.25	16.25	34.75	17.25
Fairless, Pa. N3	...	...	...	...	...	...	24.25	...	27.25	...	29.75	...	32.25	...	32.75	...
Fontana, Calif. K1 (§)	...	...	...	...	...	...	13.25	+3	16.25	1	18.75	4.5	21.25	5.5	21.75	6.5
Ind. Harbor Y1 (††)	...	...	...	...	...	...	23.25	9	28.25	13	30.75	16.5	33.25	17.5	33.75	18.5
Lorain, O. N3 (*)	...	...	...	...	...	...	26.25	16	29.25	20	31.75	23.5	34.25	23	34.75	24
Sharon, Pa. S4 (‡)	26.5	—0.25	19.50	+4.25	12.5	+8.5	...	...	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	...	...	...	...	26.25	11	29.25	15	31.75	18.5	34.25	19.25	34.75	20.25
Sparrows Pt., Md. B2 (§)	24.5	+1.75	17.5	+6.25	10.5	+10.5	24.25	8	27.25	12	29.75	15.5	32.25	16.5	32.75	17.5
Youngstown R2 (**)	...	...	...	...	...	...	26.25	12	29.25	16	31.75	19.5	34.25	20.0	34.75	21.0
Youngstown Y1 (††)	...	...	...	...	...	...	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5
Wheatland, Pa. W9 (§)	24.5	+1.75	17.5	+6.25	10.5	+10.5	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5

Size—Inches	2		2½		3		3½		4	
List Per Ft	37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	35.25	20	36.75	20	36.75	20	...	...	...	...
Alton, Ill. L1 (§)	33.25	18.75	34.75	18	34.75	18	...	...	...	...
Benwood, W. Va. W10(††)	35.25	20.75	36.75	20.5	36.75	20.5	27.75	11	27.75	11
Etna, Pa. N2 (†)	35.25	17.25	36.75	18.5	36.75	18.5	27.75	9	27.75	9
Fairless, Pa. N3	33.25	...	34.75	...	34.75	...	25.75	...	25.75	...
Fontana, Calif. K1 (§)	22.25	7	23.75	7	23.75	7	...	...	...	...
Ind. Harbor, Ind. Y1 (††)	34.25	19	35.75	19	35.75	19	...	...	...	...
Lorain, O. N3 (*)	35.25	24.5	36.75	23	36.75	23	...	...	...	...
Sharon, Pa. M6	35.25	20.75	36.75	20.5	36.75	20.5	...	...	...	...
Sparrows Pt., Md. B2 (§)	32.25	18	34.75	18	34.75	18	25.75	8.5	25.75	8.5
Youngstown R2 (**)	35.25	21.5	36.75	21.0	36.75	21.0	27.75	11.5	27.75	11.5
Youngstown Y1 (††)	35.25	20	36.75	20	36.75	20	...	...	...	...
Wheatland, Pa. W9 (‡)	35.25	20	36.75	20	36.75	20	...	...	...	...

Galvanized pipe discounts based on zinc price of: (†), 14c; (‡), 11c to under 12c; (*), 5c, ($), 10c to under 11c; (††), 10.50c-11.50c; (**), 9.50c; with discounts adjusted on price of zinc at time of shipment.

BOILER TUBES

Net base c.l. prices, dollar per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	...	19.02	18.44
1¼	13	...	22.53	18.12
1½	13	20.65	24.91	20.01
1¾	13	24.40	29.43	23.66
2	13	27.34	32.98	26.51
2¼	13	30.80	37.15	29.86
2½	12	33.43	40.32	32.41
2½	12	36.82	44.41	35.70
2¾	12	39.87	48.09	38.66
3	12	42.52	51.28	41.23

RAILWAY MATERIALS

RAILS	Std. No. 1	Std. No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer, Pa. U5	4.325	4.225	4.275	5.20
Ensley, Ala. T2	4.325	4.225	...	5.20
Fairfield, Ala. T2	...	...	...	5.20
Gary, Ind. U5	4.325	4.225	4.275	...
Huntington, W. Va. W7	...	...	...	5.20
Indiana Harbor, Ind. I-2	4.325	4.225	4.275	...
Johnstown, Pa. B2	...	...	...	(16)5.20
Lackawanna, N.Y. B2	4.325	4.225	...	5.20
Minnequa, Colo. C10	4.325	4.125	...	5.70
Steelton, Pa. B2	4.325	4.225	...	...
Williamsport, Pa. S19	...	...	...	5.20

TIE PLATES	
Fairfield, Ala. T2	5.125
Gary, Ind. U5	5.125
Ind. Harbor, Ind. I-2	5.125
Lackawanna, N.Y. B2	5.125
Minnequa, Colo. C10	5.125
Pittsburg, Calif. C11	5.275
Seattle, B3	5.275
Steelton, Pa. B2	5.125
Torrance, Calif. C11	5.275

TRACK BOLTS (20) Treated	
Cleveland, R2	11.00
Kansas City, Mo. S5	11.00
Lebanon, Pa. B2	11.00
Minnequa, Colo. C10	11.00
Pittsburgh, O2, P11	11.00

JOINT BARS	
Bessemer, Pa. U5	5.275
Fairfield, Ala. T2	5.275
Ind. Harbor, Ind. I-2	5.275
Joliet, Ill. U5	5.275
Lackawanna, N.Y. B2	5.275
Minnequa, Colo. C10	5.275
Steelton, Pa. B2	5.275

AXLES	
Ind. Harbor, Ind. S13	6.50
Johnstown, Pa. B2	6.50

STANDARD TRACK SPIKES	
Fairfield, Ala. T2	7.05
Ind. Harbor, Ind. I-2, Y1	7.05
Kansas City, Mo. S5	7.30
Lebanon, Pa. B2	7.05
Minnequa, Colo. C10	7.05
Pittsburgh, Pa.	7.05
Seattle, B3	7.55
So. Chicago, Ill. R2	7.05
Struthers, O. Y1	7.05
Youngstown, R2	7.05

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural, ½-in. & larger 5.90c
½-in. under 6.25 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers List

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern points, per cent off list for less than case lots to consumers)

6 in. and shorter
½-in. & smaller diam. 4
⅝-in. & ⅞-in. 3
1-in. and larger 2
Longer than 6 in.: 1
All diams. 4
Lag bolts, all diams.:
6 in. and shorter 12
Over 6 in. long 8
Ribbed Necked Carriage 5
Blank 2
Plow 23
Step, Elevator, Tap and Sleigh Shoe 12
Tire Bolts List
Boiler & Fitting Up Bolts 25

NUTS

H.P. & C.P., regular & heavy:
Square, all sizes 5
H.P., Hex, regular & heavy:
⅜" and smaller 58
⅞" to 1⅛", inclusive 60
1¼" to 1½", inclusive 62
1⅝" and larger 65
C.P. Hex, regular & heavy:
All sizes 58
Hot Galv. Nuts (all types):
⅜" and smaller 40
⅞" to 1½", inclusive 43
Finished Hex. Nuts:
New standard, all sizes 58
Semifinished & Slotted Hex:
Regular and heavy:
all sizes 55

HEADLESS SET SCREWS

(Packaged, per cent off list)

No. 10 and smaller 34
¼-in. diam. & larger 14
N.F. thread, all diams 8

STEEL STOVE BOLTS

(F.o.b. plant, per cent off list in packages)

Plain finish 47 & 10
Plated finishes 30 & 10

HEXAGON CAP SCREWS

(1020 steel, packaged, per cent off list)

6 in. or shorter
⅝ in. & smaller 35
¾-in. through 1 in. 22
Longer than 6 in.
⅝-in. and smaller 20
¾-in. through 1 in. 7

SQUARE HEAD SET SCREWS

(Packaged, per cent off list)

1 in. diam. x 6 in. and shorter 34
1 in. and smaller diam. x over 6 in. 20

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

Sponge Iron:	Cents
98+% Fe, annealed	18.00
Unannealed	
Minus 100 mesh	14.50
Minus 325 mesh	16.50
Minus 200 mesh	16.00
Swedish, c.l. f.o.b. N.Y. c.l., in bags	11.25
Domestic (Swedish), f.o.b. Riverton, N.J., in bags	11.25
Electrolytic Iron:	
Melting stock, 99.91% Fe, irregular fragments of ¾ in. x ½ in.	23.00
Annealed, 99.5% Fe	42.50
Unannealed (99+% Fe)	36.50
Unannealed (98+% Fe), (minus 325 mesh)	53.50
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron:	
97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum:	
Atomized, 500 lb drums, freight allowed:	
Carlots	31.00
Ton lots	34.00
Antimony, 500 lb lots	32.00*
Brass, ¼ ton lots	28.75-37.50†
Bronze, ¼ ton lots	50.00-60.00†
Copper:	
Electrolytic	13.50*
Reduced	13.50*
Lead	7.50*
Magnesium	54.00-56.00
Manganese:	
Minus 35 mesh	61.00
Minus 100 mesh	67.00
Minus 200 mesh	72.00
Nickel, unannealed	89.50
Nickel Silver, ¼ ton lots	44.00-49.00‡
Nickel Silver, ¾ ton lots	16.75**
Phosphor Bronze, ¼ ton lots	58.50
Silicon	43.50
Solder	8.50*
Stainless Steel, 302	91.00
Tin	14.50*
Zinc, ¼ ton lots	12.00-28.75‡
Tungsten	Dollars
Melting grade, 99% 60- to 200- mesh:	
1000 lb and over	4.95
Less than 1000 lb	5.10
Chromium, electrolytic 99.8% Cr min.	3.50

*Prin. cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 29% Zn, 1% Sn. **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Aspirin, flat, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼" to 1 7/16", 1 7/16" to 1 15/16", 1 15/16" to 2 7/16", 4.50c.
(6) 4 brass or Rem. base.
(7) To jobbers, 5 cols. lower.
(8) 16 gage and heavier, 6 in. and narrower.
(9) Pittsburgh base.
(10) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.90c.
(15) ⅝" and thinner, 6 in. and narrower, 6.50c; wider than 6 in., 7.00c.
(16) 40 lb and under.
(17) Flats only, 0.25 in. & heavier.
(18) To dealer.
(19) Chicago & Pitts. base.
(20) 0.25c off for untreated.
(21) New Haven, Conn. base.
(22) Del. San Francisco Bay area.
(23) 20 Ga. 36" wide.
(24) Deduct 0.45c, floor than 16 Ga.
(25) Bar mill bands.
(26) Reinforcing mill lengths, to fabricators, to consumers, 5.40c.
(27) Bar mill size.
(28) Reinforced.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.4c for carbon and 0.55c for H.S.L.A.
(31) Base; deld. within mill county.
(32) To jobbers, deduct 20c.
(34) 9 cwt. for cut lengths.
(35) 12 gage and narrower.
(36) 14" and narrower.
(37) 11 gage & lighter, 60" & narrower.
(38) 14 gage & lighter, 48" and narrower.
(39) 48" and narrower.
(40) Lighter than 0.055", 0.055" and heavier, 0.25c lighter.
(41) 5 bbl. for cut lengths.
(42) 6.7 gage.
(43) 1 pail, deduct 2 cols for 1 pail.

STAINLESS STEEL MILL PRICES

(Representative prices, cents per pound, subject to current lists of extras)

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	Shapes; H.R. & C.F. Bars; H.R. Strip	Plates	Sheets	C.R. Strip; Flat Wire
301	16.25	20.50 - 29.50	34.25	29.75	35.25	37.25	46.25	68.25
302	17.25	22.75	29.75	34.50	32.00	35.50	37.50	46.50	41.50
302B	18.50	24.50	30.50	34.50	35.00	35.50	37.50	48.75	44.75
303	18.75	24.75	32.25	37.25	36.75	38.25	39.75	48.75	45.50
304	18.25	24.75	31.00	36.00	34.25	37.25	39.75	48.75	43.75
304L			36.75			42.75	45.25	54.25	49.00
305	19.50	25.50		36.25	37.00	37.50	42.00	51.75	46.75
308	19.75	26.25	35.25	40.75	38.00	42.00	46.00	55.25	48.00
309	26.50	34.75	43.25	49.25	49.25	50.50	53.75	63.50	62.00
309S	28.50	37.50	47.50	54.50	54.00	55.50	59.00	68.50	68.50
310	33.00	44.25	56.75	66.25	67.50	67.50	69.00	72.25	78.75
314							69.00	74.50	
316	28.00	36.25	46.75	54.50	55.00	55.50	59.00	64.50	66.50
316L			52.50			61.00	64.25	70.00	72.00
317	33.00	43.50	58.25	66.75	67.50	68.25	70.75	77.00	79.25
318	32.50	44.00	55.25	64.50	66.25	65.50	68.75	78.00	80.25
321	22.75	29.50	34.25	40.75	42.00	42.00	46.00	55.50	54.50
326			58.00			68.50	70.00	73.75	77.75
330	24.50	32.25	39.50	44.75	46.50	46.75	51.25	60.75	59.25
347			37.00	50.75		52.00	54.25	64.00	61.25
348	19.50*	21.75	25.25	29.25	30.50	30.25	31.75	42.50	39.75
416	14.00	18.25	24.00	27.75	26.25	28.75	30.00	40.75	34.25
418			24.50	28.25		29.25	30.50	41.25	41.25
420	22.00	28.50	29.25	34.00	35.50	35.00	38.50	49.25	52.75
430	14.25	18.50	24.50	28.25	27.00	29.25	30.50	43.50	34.75
430F		18.75	25.00	28.75		29.75	31.00	44.00	44.00
431	14.50	28.50	25.00	28.25	27.50	29.25	30.50	44.00	35.25
440A, B,C		28.50	29.25	34.00		35.00	38.50	49.25	52.75
442			28.00			30.50	35.25	48.25	47.75
446			33.75	38.25	53.00	39.50	40.75	59.75	71.00
501			14.00	14.50	21.25	16.00	18.25	30.50	29.00
502			15.25	16.00	22.25	17.00	20.00	31.75	30.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Closter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Twins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Shenango Ageloy Tube Co.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Fred Ulbrich & Sons; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

CLAD STEEL

Cladding Stainless	Plates: Carbon Base 10%	Plates: Carbon Base 20%	Sheets: Carbon Base 20%	Sheets: Copper Base Both Sides
302		31.00	31.00	77.00
304	27.60	32.50-32.70	32.50	77.00
310	36.50	41.00		144.00
316	32.60*	37.70-42.75	42.75	
318	37.00	42.20		
321	29.30	34.40-37.00	37.00	111.00
347	30.40	35.50-40.50	40.50	130.00
405	23.40	30.60		
410	22.90	30.10		
430	22.90	30.10		
Inconel	41.23	54.18		165.00
Nickel	37.50	50.60		
Monel	38.90	51.80		
Copper*			46.00	

	Strip, Carbon Base: Cold-Rolled 10%	Cold-Rolled Both Sides	Hot-Rolled 10%	Hot-Rolled Both Sides
Copper*			46.00	

*Deoxidized. Production point: Stainless sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. I-7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville I-7; copper-clad strip, Carnegie, Pa. S15. Production point for copper-base sheets is Carnegie, Pa. A13.

TOOL STEEL

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.25	5% Cr Hot Work	0.39
Extra Carbon	0.30	W-Cr Hot Work	0.41
Special Carbon	0.35	V-Cr Hot Work	0.42-.43
Oil Hardening	0.37-.390	Hi-Carbon-Cr	0.665-.79

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25		3.875
18.25	4.25	1	4.75		2.150-2.320
18	4	2	9		2.515
18	4	2			1.640
18	4	1			1.480
13.5	4	3			1.735
6.4	4.5	1.9		5	1.005-1.055
6	4	3		6	1.240
2	1.4	1.2			0.495
1.5	4	1		8.5	0.865-0.895

Tool Steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2 and V3.

PIG IRON

Gross Ton

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
AlabamaCity R2	52.38	52.88		
Birmingham R2	52.38	52.88		
Birmingham U6		52.88		
Woodward,Ala. W15	52.38	52.88	56.50†	
Cincinnati, del.		69.43		
Buffalo District				
Buffalo R2, H1	56.00	56.50	57.00	
Tonawanda,N.Y. W12	56.00	56.50	57.00	
No. Tonawanda,N.Y. T9		56.50	57.00	
Boston, del.	66.65	67.15	67.65	
Rochester,N.Y. del.	59.02	59.52	60.02	
Syracuse,N.Y. del.	60.12	60.62	61.12	
Chicago District				
Chicago I-3	56.00	56.50	56.50	57.00
Gary,Ind. U5	56.00		56.50	
IndianaHarbor,Ind. I-2	56.00		56.50	
So.Chicago,Ill. W14, Y1	56.00	56.50	56.50	
So.Chicago,Ill. U5	56.00		56.50	57.00
Milwaukee, del.	58.17	58.67	58.67	59.17
Muskegon,Mich., del.		62.80	62.80	
Cleveland District				
Cleveland A7	56.00	56.50	56.50	57.00
Cleveland R2	56.00	56.50	56.50	
Akron,O., del. from Cleve.	58.75	59.25	59.25	59.75
Lorain,O. N3	56.00			57.00
Mid-Atlantic District				
Bethlehem,Pa. B2	58.00	58.50	59.00	59.50
New York, del.		62.28	62.78	
Newark, del.	61.02	61.52	62.02	62.52
Hillsboro,Pa. B10	58.00	58.50		
Steelton,Pa. B2	58.00	58.50	59.00	59.50
Swedeland,Pa. A3	58.00	58.50	59.00	59.50
Philadelphia, del.	59.66	60.16	60.66	61.16
Troy,N.Y. R2	58.00	58.50	59.00	
Pittsburgh District				
Neville Island,Pa. P6	56.00	56.50	56.50	57.00
Pittsburgh (N&S sides), Ambridge, Aliquippa, del.	57.37	57.87	57.87	58.37
McKeesRocks, del.	57.04	57.54	57.54	58.04
Lawrenceville, Homestead, Wilmerding, Monaca, del.	57.66	58.16	58.16	58.66
Verona, Trafford, del.	58.19	58.69	58.69	59.19
Brackenridge, del.	58.45	58.95	58.95	59.45
Bessemer,Pa. U5	56.00		56.50	57.00
Clairton,Rankin,So.Duquesne,Pa. U5	56.00			
McKeesport,Pa. N3	56.00			57.00
Midland,Pa. C18	56.00			
Monessen,Pa. P7	56.00			
Youngstown District				
Hubbard,O. Y1			56.50	
Sharpsville,Pa. S6	56.00	56.50	56.50	57.00
Youngstown Y1			56.50	57.00
Youngstown U5	56.00			57.00
Mansfield,O., del.	60.90		61.40	61.90
Duluth I-3	56.00	56.50	56.50	57.00
Erie,Pa. I-3	56.00	56.50	56.50	57.00
Everett,Mass. E1	62.50	63.00	63.50	
Fontana,Calif. K1	62.00	62.50		
Geneva,Utah C11	56.00	56.50		
GraniteCity,Ill. G4	57.90	58.40	58.90	
Ironton,Utah C11	56.00	56.50		
LoneStar,Texas L6	52.00	52.50*	52.50	
Minnequa,Colo. C10	58.00	59.00	59.00	
Rockwood,Tenn. T3			56.50	
Toledo,O. I-3	56.00	56.50	56.50	57.00
Cincinnati, del.	61.76	62.26		

*Low phos. southern grade. †Phos., 0.30 max.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si; 75 cents for each 0.5% Mn over 1%)

Jackson,O. G2, J1	$67.00
Buffalo H1	68.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.45 for each 0.5% Mn over 1%; $2 per gross ton premium for 0.045% max. P)

NiagaraFalls, N.Y. P15	$87.50
Keokuk,Iowa, Openhearth & Fdry. freight allowed K2	92.00
Keokuk, OH & Fdry. 12½ lb piglets, 16% Si, frt. allowed K2	95.00
Wenatchee,Wash. OH & Fdry, freight allowed K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$61.00
Rockwood,Tenn. T3	70.00
Steelton,Pa. B2	64.00
Philadelphia, del.	64.00
Troy,N.Y. R2	64.00

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(Representative prices, cents per pound, subject to extras, f.o.b. warehouse. City delivery charges are 20 cents per 100 lb except: New York, 30 cents; Philadelphia, 25 cents; Birmingham, Erie, Cincinnati, St. Paul, 15 cents; Seattle and Spokane, Wash., no charge.)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot Rolled	Cold Rolled	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††◊		Carbon	Floor
Baltimore	6.20	7.12	7.36	7.00	...	6.86	8.17◆	12.04	6.98	6.85	7.98
Birmingham	6.10	7.00	8.00◆	6.30	...	6.15	8.90	....	6.35	6.35	8.25
Boston	6.89	7.83	9.18	7.13	...	6.87	8.35	12.28	7.06	7.13	8.26
Buffalo	6.18	7.15	8.65	6.79	...	6.35	7.70	12.17	6.59	6.68	7.88
Charlotte, N. C.	6.95	7.80	8.69	6.90	...	7.10	8.37	....	7.10	7.10	8.37
Chicago	6.18	7.12	7.95	6.42	...	6.28	7.39	11.75	6.46	6.33	7.46
Cincinnati	6.51	7.19	7.95	6.72	...	6.58	7.66	12.17	6.93	6.80	7.88
Cleveland	6.18	7.12	7.90	6.58	...	6.34	7.40	11.89	6.79	6.50	7.79
Detroit	6.38	7.31	8.22	6.71	7.36	6.56	7.60	12.12	6.93	6.80	7.80
Erie, Pa.	6.13	...	8.15	6.38	...	6.23	7.50◆	....	6.50	6.36	7.79
Houston	7.15	7.60	9.40	7.45	9.30	7.45	9.30	....	7.35	7.20	8.55
Los Angeles	7.25	9.00	9.35	7.55	11.20	7.15	9.10	13.05	7.35	7.20	9.25
Milwaukee	6.35	7.29	8.12	6.59	...	6.45	7.57	11.92	6.63	6.50	7.63
Moline, Ill.	6.53	7.47	8.35	6.77	...	6.63	7.65	....	6.81	6.68	...
New York	6.78	7.75	◆8.37	7.16	...	7.06	8.43◆	12.14	6.90	6.99	8.30
Norfolk, Va.	6.90	...	...	7.20	...	7.20	8.50	....	7.20	7.15	7.86
Philadelphia	6.35	7.13	8.16	7.02	8.80	6.87	8.15◆	11.89	6.67	6.63	7.65**
Pittsburgh	6.18	7.12	8.00	6.55	...	6.28	7.65	11.89	6.46	6.33	7.46
Portland, Oreg.	7.90	8.45	9.15	7.65	...	7.35	10.65	....	7.25	7.30	9.15
Richmond, Va.	6.50	7.45	8.00	7.10	...	7.05	7.95	....	7.10	6.85	8.10
St. Louis	6.48	7.42	8.25	6.72	...	6.58	7.70	12.05	6.86	6.73	7.86
St. Paul	6.84	7.78	8.66	7.08	...	6.94	8.06	....	7.12	6.99	8.12
San Francisco	7.35	8.70	9.30	7.60	...	7.15	9.75	13.05	7.25	7.20	9.25
Seattle	8.15	9.50	9.80	8.00	...	7.60	10.65	13.50	7.50	7.60	9.40
Spokane	8.15	9.40◆	9.80	7.60	...	7.60	10.55◆	14.15	7.25	7.35	9.40
Washington	6.71	8.15	8.35	7.51	...	7.37	8.43	....	7.49	7.36	8.49

*Prices do not include gage extras; †prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extras excluded); ‡includes 25-cent special bar quality extra; §as rolled; **⅜-in. and heavier, add 0.35c for 12 gage and lighter. ††as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, and cold-finished bars, 2000 lb and over, except in Seattle where base is 2000 to 9999 lb; ◆—500 to 1999 lb; ◆◆—1000 to 1999 lb; ◆—1000 lb and over; ◆—1500 lb to 3999; ◆—under ½ in.

Warehouses Still Await Buying Pickup

Order volume not up to seasonal expectations with users still reducing inventories. Sluggishness reflected in continued shading of extras at some points

Philadelphia Warehouse prices continue to reflect shading in extras, particularly quantity extras, and may soon show a reduction in base prices. Lower railroad freight rates, scheduled for last Friday, will undoubtedly be one factor in the revision of base prices. Meanwhile, warehouse business has been at least sustained, although there has not been the increase in the daily rate anticipated by some for March. Shapes and cold-rolled sheets appear in best demand.

Cleveland Local distributors report they are booking orders in fair volume but that tonnage is not up to expectations for this season. Some gains in buying of building steel are noted, and this trend is expected to increase as the season advances. Prices on secondary material are being shaded and this is cause for some instability pricewise in the prime market. However, except for freight absorption, standard prices on prime items are holding as a general thing.

Pittsburgh Sales show a slim increase from February totals at some distributors, while others expect no gains until April. Seasonal increases in sales have not been as large as expected. Distributors are continuing to trim inventories of slow-moving items. Most ordering is on a day-to-day basis.

Chicago Warehouse sales volume holds steady although it lacks indications of an upturn soon. There is plenty of optimism that it will come, however. It is pointed out consumers still are doing considerable inventory reducing and end of this approaches. Another encouraging sign is that hard goods manufacturers are figuring on a substantial amount of business and are hopeful of getting a reasonable part of it signed up.

Los Angeles Warehouse activity is higher and March inquiries are 5 to 10 per cent more numerous than in February. Price shading by smaller warehouses is not enough to dis-

STEEL IMPORT PRICES

(Base, per 100 lb, landed, duty paid)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A-305	$4.75	$4.85	$4.75	$5.00
Bar Size Angles	4.39	4.49	4.39	4.67
Structural Angles	4.39	4.49	4.39	4.67
I-Beams	4.39	4.49	4.39	4.67
Wide Flange Beams	4.94	5.02	4.94	5.22
Sheet and Plate, 10 gage, 11 gage, 5' x 10'	5.87	5.96	5.87	6.25
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.00	25.70	26.50	28.34
Barbed Wire	6.20	6.30	6.20	6.48
Merchant Bars	4.65	4.75	4.65	4.93
Hot Rolled Bands	4.65	4.75	4.65	4.93
Wire Rods, Thomas Commercial No. 5	4.77	4.84	4.82	5.09
Wire Rods, O-H, Cold Heading Quality No. 5	5.23	5.30	5.28	5.55
Channels	4.49	4.59	4.49	4.77
Bright Common Wire Nails, 8d	6.55	6.65	6.60	6.85

Size O.D.	Wgt/Foot/Lb	Gulf Port	West Coast	Vancouver
Seamless A.P.I. Casing, Grade J-55:				
5½ in.	15.5	$1.47/ft	$1.51/ft	$1.32/ft
7 in.	23	2.10/ft	2.17/ft	1.90/ft
Seamless N-80 Casing:				
5½ in.	17	1.94/ft	2.00/ft	1.75/ft
7 in.	23	2.50/ft	2.70/ft	2.34/ft
Seamless J-55 Tubing:				
2⅜ in.	4.7	0.60/ft	0.63/ft	0.55/ft
2⅜ in.	6.5	0.80/ft	0.83/ft	0.73/ft

Sources of shipment: Western continental European (Schuman Plan) countries

disturb the general price structure. April is expected to show a sharp rise in activity.

Boston First quarter steel warehouse sales are disappointing, off 30 to 40 per cent from the first three months, 1953. Decline in tonnage has been accompanied by price easing in some products, including flat-rolled. Smaller size of the average order marked return of normal mill buying by many consumers. Number of orders is substantial, but they are small, tending to add to distribution costs.

At the current rate of sales, inventories of distributors of more standard carbon products, including sheets, are large and they are placing orders with suppliers sparingly. March sales on a day-to-day basis improved little compared with the previous month.

January Steel Shipments Up

New York Shipments of finished steel in January to the automotive, farm implement and container industries were higher than shipments to those industries in December, reports the American Iron & Steel Institute.

January shipments totaled 5,727,600 net tons, approximately 43,000 tons more than in the previous month.

Shipments to the automotive industry in January were 1,122,505 tons, nearly 300,000 tons more than in December and the highest total since September. Shipments to farm equipment makers amounted to 82,208 tons, the largest since October, while shipments to container makers at 502,024 tons were the largest since August. Electrical equipment took 158,173 tons in January, slightly more than in December.

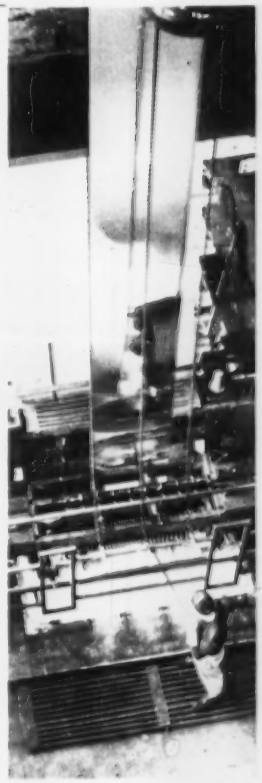
Direct shipments of steel to the construction industry totaled 774,913 tons, about 75,000 less than in December. This was the only classification to show an increase over one year earlier, the gain being 1800 tons.

Although total shipments of steel products for railroad use were lighter than in any month last year, at 360,012 tons, the shipments of heavy rails were unusually large at 170,935 tons, compared with a monthly average of 155,545 tons in 1953. Shipments of structural shapes, electrolytic tin plate, cold-rolled sheets and oil country pipe constituted larger proportions of total shipments in January than in 1953 as a whole.

Warehouses took 982,531 tons of steel in January, compared with an average of over 1,200,000 tons a month last year.

CONTINUOUS HOT-DIP GALVANIZING LINES GROW

Companies	No. Lines	Location
In Operation		
Armco Steel Corp.	2	Butler, Pa.
Armco Steel Corp.	2	Middletown, O.
Bethlehem Steel Co.	1	Sparrows Point, Md.
Columbia-Geneva Steel Div., U. S. Steel Corp.	1	Pittsburg, Calif.
Inland Steel Co.	1	Indiana Harbor, Ind.
Sharon Steel Corp.	1	Farrell, Pa.
Tennessee Coal & Iron Div., U. S. Steel Corp.	3	Fairfield, Ala.
U. S. Steel Corp.	1	Gary, Ind.
U. S. Steel Corp.	2	Irvin Works, Dravosburg, Pa.
Weirton Steel Co.	2	Weirton, W. Va.
Wheeling Steel Corp.	1	Martins Ferry, O.
Under Construction		
Armco Steel Corp. (operation in Aug.)	2	Ashland, Ky.
Inland Steel Co. (operation in May)	1	Indiana Harbor, Ind.
U. S. Steel Corp.	1	Gary, Ind.
Being Considered		
Bethlehem Steel Co.		Sparrows Point, Md.
Columbia-Geneva Steel Div., U. S. Steel Corp.	1	Pittsburg, Calif.
Republic Steel Corp.	1	Cleveland, O.
Wheeling Steel Corp.	1	Martins Ferry, O.



Armco

Continuous Galvanizing: New Lines of Business

By ROBERT M. LOVE
Pittsburgh Editor

STEEL EXPANSION is entering a new phase now that most producers have completed increases in ingot capacities. Plans center on expansion of finishing facilities, such as continuous galvanizing of sheets. Topmost in industry's planning is broadening the sales potential.

Several steelmakers report new lines for continuous galvanizing furnish this needed widening of sales. Wide range of galvanized sheet consumers shows extent of customers attracted by new lines.

Best Customers "Chief users of galvanized sheet products include agricultural equipment makers, producers of agricultural roofing and siding, culverts and drainage systems," comments James Barton, manager of sheet and strip sales, U. S. Steel Corp., Pittsburgh. "Producers of containers, downspouts, pails and buckets use galvanized sheet. Industrial plants use the sheet for external applications."

Pointing out advantages of the continuous galvanized product, officials of Sharon Steel Corp., Sharon, Pa., say, "Our hot-dipped, zinc-coated steel has high resistance to atmospheric corrosion and provides an excellent surface for paint."

Various Means The steel industry uses three main methods to galvanize sheets. Hot-dipping of individual sheets and electrolytic coating of sheet on a continuous line are both in use. A later development, continuous hot-dip galvanizing, now accounts for the bulk of production and most new capacity.

Although continuous processes differ, most start with a full hard coil of steel. The unwinding coil is cleaned, heated and bathed in zinc. After coating, the strip is cooled and coiled or sheared.

Shipments Increase American Iron & Steel Institute statistics show 2,290,868 net tons of galvanized sheets were shipped in 1953, compared with 1,984,961 tons in 1951.

Nine of 17 makers of galvanized

sheets have continuous lines. Several additional lines are under construction, and others are being considered. (See accompanying table).

"With completion of new units the industry will have an annual capacity of well over 1 million tons per year in continuous galvanized sheets," says E. F. Lundeen, assistant superintendent, quality control department, Inland Steel. Other estimates place continuous capacity slightly over 50 per cent of total galvanizing capacity.

Advantages—Why the accent on continuous galvanizing in new installations? Nelson E. Cook, general superintendent of galvanizing operations, Wheeling Steel, replies: "More uniform coatings are possible in continuous methods. Zinc metal is more effectively used. There are no front or 'drip' ends after the coating."

"Continuous coating of strip steel can be done at greatly increased speed with greater production per man-hour," Mr. Cook continues. Availability of the product in coil is another advantage of the continuous process.

Criticism—Says a skeptic, "We agree that the coating process is tighter for the working of most products, but we do not feel enough zinc is applied to the sheet in the continuous process. Rolls may squeeze off part of the coating. Individual dipping gives a better coating."

Against this criticism continuous galvanizers point to improvements in their product. They say extremely tight coatings can be achieved by using a small amount of aluminum in the zinc bath. Their product is well suited for stamping and drawing operations, they emphasize while predicting that nearly all galvanizing soon will be done by the continuous method.

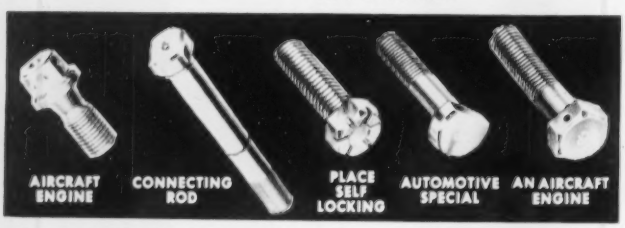
Proved by Test—With successful applications to its credit in drawing and stamping fields, improved galvanized sheets are also bolstering steel's competitive position with other metals under corrosive conditions.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 142

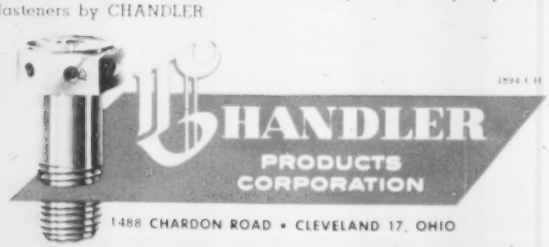
Seattle—Mill operations are unchanged here. Order backlogs are down though a fair volume of small tonnages was booked over the last month. Several major projects involving reinforcing are up for early action.

THERE'S A CHANDLER FASTENER FOR EVERY APPLICATION



There is a CHANDLER cold wrought metal fastener to meet your specifications. Manufactured from the finest steel stock available, these metal fasteners are rigidly inspected to insure uniformity, accuracy, and precision. CHANDLER fasteners provide maximum resistance to stress, vibration and shear. To meet your industrial requirements, specify cold forged fasteners by CHANDLER.

Write today for Bulletin No. 1264-CH



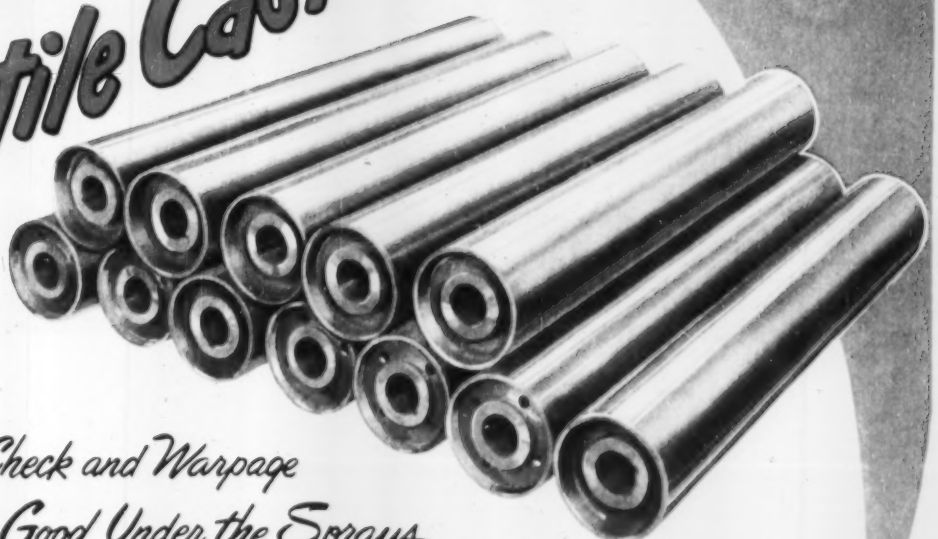
1488 CHARDON ROAD • CLEVELAND 17, OHIO

Reduce Maintenance

HOT STRIP RUN-OUT TABLE

with Y&M

Ductile Cast Iron ROLLS



Resist Heat Check and Warpage
Exceptionally Good Under the Sprays

We invite your inquiries on table rolls or any other ductile cast iron castings up to 100,000 pounds.

The Youngstown Foundry & Machine Co.

OVER SIXTY YEARS OF SERVICE TO THE STEEL INDUSTRY

Youngstown, Ohio

12

AIRCRAFT, ALLOY, STAINLESS CARBON STEELS

IN

FLATS · ROUNDS · SQUARES HEXAGONS · SPECIAL SHAPES & PROTOTYPE FORGINGS

	Thick	Wide	Long
FLATS	¼"	¾"-4"	8 ft.
	⅜"	½"-6"	10 ft.
	½"	⅝"-6"	10 ft.
	⅝"-⅞"	¾"-10"	12 ft.
	1"-1¼"	1⅛"-10"	12 ft.
	1⅜"-1¾"	1½"-10"	16 ft.
	1⅞"-3"	2"-12"	16 ft.
	3⅛"-5"	3¼"-16"	16 ft.

ROUNDS — ½"-12"

SQUARES — ½"-12"

HEXAGONS — ½"-5"

Max. Bar Wgt. 5000 lbs.
Max. Bar Lgt. 20 ft.

Ends Cold Sawed

All steel smooth forged to standard forging tolerances ★ Complete facilities in our own plant for rough turning and rough boring ★ Heat treating facilities for bars max. length 20 ft.

McINNES STEEL COMPANY

SINCE 1895

MILL: CORRY, PENNSYLVANIA

Offices in all principal cities

Sheets, Strip . . .

Sheet and Strip Prices, Page 143 & 144

Boston—Consumers are figuring costs closely. Price-wise, slit semi-bright finished sheets have until recently been bumping cold-rolled strip and more sheet users "make-do" with cold-rolled wasters. The latter, at 55 to 65 per cent of prime steel cost, find a ready market. Except for this price-buying, demand for flat-rolled carbon is slow with the pattern unchanged for April, namely fill-in orders geared to consumption.

Only in rare cases are consumers' production schedules up slightly. One range builder maintains enameling sheet requirements, but electrical sheets in coils are slow. Suppliers of automotive stamped parts lack normal forward commitments through second quarter.

Contributing to consumer need for lower cost is competitive pressure for lower fabricated product prices. An extreme case is 275-gallon household oil tanks. Fabricated from No. 12 gage hot-rolled pickled sheets, tanks are selling at about one-half the price prevailing only a few months back and inventories are substantial.

New York—While business continues slow, some sheet sellers believe there has been sufficient improvement over a sufficient length of time to indicate a definite uptrend. Most sellers say orders over the past three or four weeks have expanded slightly. This is particularly true in cold-rolled sheets. Orders now coming in for April encourage the belief the uptrend may continue during the new month. It is the definite opinion of some sheet sellers that the downtrend in business has given way to an upturn.

Pittsburgh—Mills expect some improvement in April sales, but there are open spaces in order books for that month. Optimistic predictions are based on belief ordering by automakers has reached a low point for first half.

Pittsburgh Steel Co.'s new cold-rolled mill at Allenport, Pa., shipped its first sheet ahead of schedule. Company officials think all March orders will be filled on schedule.

Cleveland—Consumers continue to order sparingly. Outlook for April volume still is considered promising, though business for the period has not developed in anything like the tonnage that had been anticipated. Heavy inventories still are being worked off by consumers. In view of the fact inventory liquidation has been going on for some months now, sheetmakers are of the opinion consumers shortly will have to sub-

(Please turn to page 154)

The trend is to Thomas for PRESSES too!

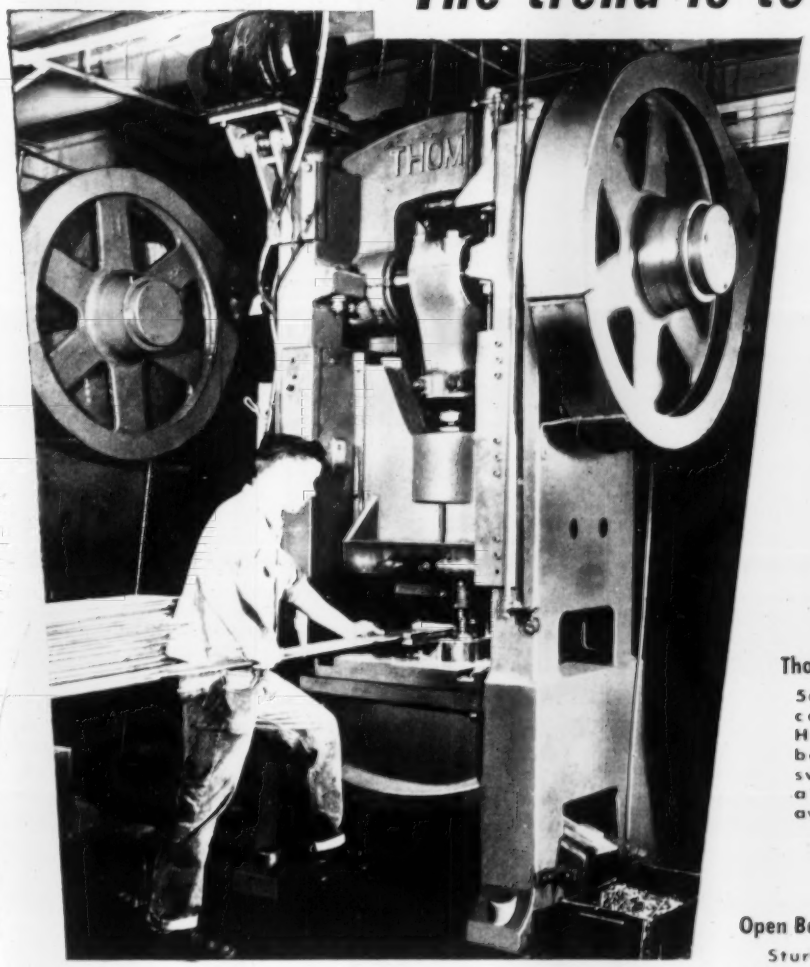
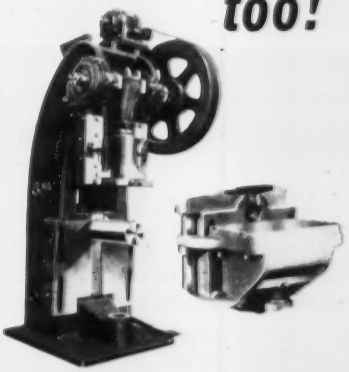
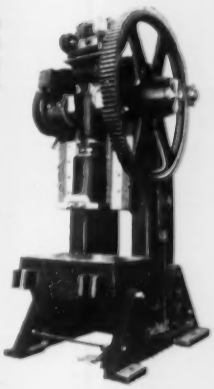


Illustration shows one of many Thomas presses in plant of McKinney Mfg Co., world-famous producers of builders' hardware.



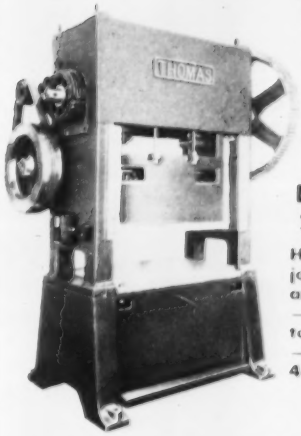
Thomas Horn Type

56 to 106 ton capacities. Horns, special bolsters and swinging bed attachments available.



Open Back Inclinable

Sturdily built for the toughest jobs, in 56, 80 and 106 ton capacities.



Double Crank Straight Side

Handles larger jobs economically. Capacities —75 to 300 tons. Bed sizes —30 x 48" to 40 x 120".

THOMAS PRESSES are designed and built by the same organization that has, for years, produced the world's leading line of spacing machines, heavy duty shears and other metal-working machinery.

In Thomas Presses you secure the advantage of rugged construction, and the utmost in mechanical efficiency and operating economy. All Thomas Presses are built to operate continuously at rated capacity!

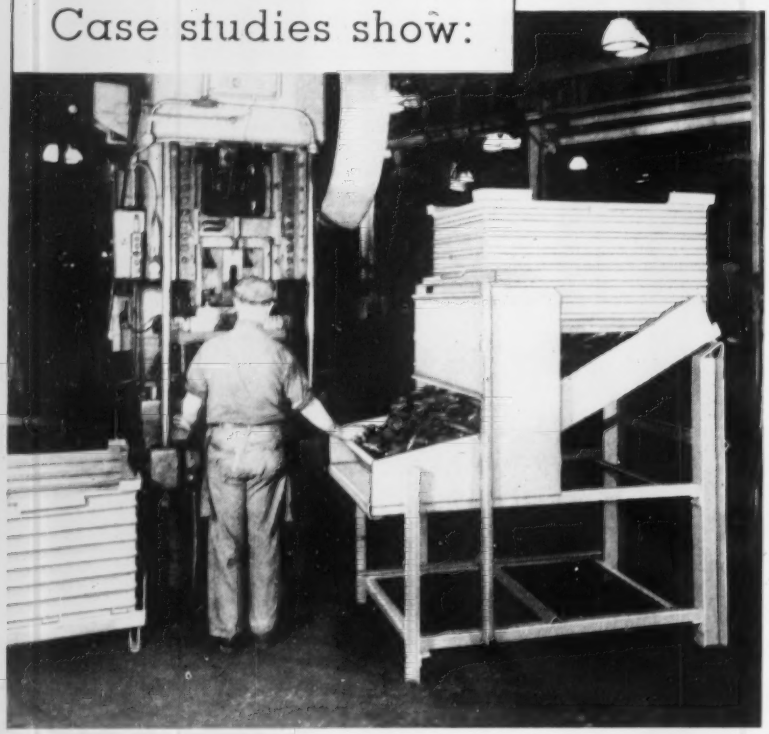
• *Let us help you select the press best fitted to your individual needs. Write.*

THOMAS
MACHINE MANUFACTURING CO.
PITTSBURGH 23, PA.

PUNCHES · SHEARS · PRESSES · BENDERS · SPACING TABLES

37

Case studies show:



50% production increase

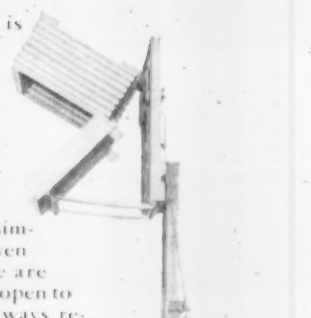
WITH WORK-O-MATIC* BOXES AND STANDS!

A SURE way to speed up production is efficient, *uninterrupted* feeding of parts-in-process at the proper working level. And the revolutionary, new Work-O-Matic drop-bottom box, when teamed with the Union Metal Positioning Stand, accomplishes this on job after job . . . up to 50% increase in production per man per machine.

In addition, versatile Work-O-Matics simplify and speed dumping and disposal. Even materials normally hard to discharge are readily dumped because Work-O-Matics open to 90 degrees. And the discharge point always remains constant at any truck fork height.

Finally, four Work-O-Matic boxes usually can be tiered in the space occupied by three ordinary skid boxes, thereby making the *most* of storage areas! Write for all the facts to The Union Metal Manufacturing Co., Canton 5, Ohio.

*Patent No. 2,445,038. Other patents pending.



UNION METAL
Materials Handling Equipment

Sheets, Strip . . .

(Concluded from page 152)

stantially enlarge purchases to care for the normal seasonal upturn in requirements.

Niles, O.—A new schedule of base prices and extras on titanium sheets, billets and bars, effective Mar. 1, is announced by the Mallory-Sharon Titanium Corp. The company quotes sheets $15 per pound, f.o.b. Niles; billets, $9 per pound; bars, $9 per pound.

Cincinnati—A minor reduction in sheet output has taken place in one of the larger mills in this area.

Detroit—Sheet sales in this area show an interesting pattern. Most auto companies have tended to reduce inventories during the last six months and are now extremely inventory conscious. The steel companies, in turn, have been moving in many instances to get their own inventories in order.

The easy steel picture has led auto companies to short delivery demands on the mills and additionally is finding many mills in other parts of the country being brought into the competition. With freight absorption in vogue, mills in the Detroit area find it difficult to increase their percentage of auto business.

Chicago—Auto manufacturers still hold back in specifying their sheet requirements for May. If an upturn in car assemblies is contemplated for late spring and early summer, increased commitments in steel shipments must come soon.

Los Angeles—Seasonal factors have boosted demand for flat-rolled. Sheetmakers expect second quarter volume to be 10 to 20 per cent higher than that in first quarter.

Steel Bars . . .

Bar Prices, Page 142

New York—Most sellers of hot carbon bars say that business is slightly improved compared with the daily rate in February. There is the feeling that April bookings will show further slight gain. An increasing number of rush orders is noted, indicating inventories have been allowed to get too low in some cases. Certain cold-drawers say business over the past month has been definitely more active. Warehouses have been specifying more freely, and industrial accounts are livelier. To date, however, deliveries continue easy. Where hot stock is on hand, converters can promise 2 to 3 weeks shipment and on certain stock items, prompt shipments.

Cleveland—Not much change in

(Please turn to page 156)

STANDARDS and SPECIALS by the Millions

THE FERRY CAP & SET SCREW CO.

2159 SCRANTON ROAD • • • CLEVELAND 13, OHIO

"SHINYHEADS"

America's Best Looking Cap Screw

Made of high carbon steel — AISI C-1038 — to standards for Full Finished hexagon head cap screws — bright finish. Heads machined top and bottom. Hexagon faces clean cut, smooth and true, mirror finish. Tensile strength 90,000 p.s.i. Carried in stock.

"HI-CARBS"

Heat Treated Black Satin Finish

Made of high carbon steel — AISI C-1038. Furnished with black satin finish due to double heat treatment. Hexagon heads die made, not machined. Points machine turned, flat and chamfered. Tensile strength in accordance with SAE Grade 5. Carried in stock.

"LO-CARBS"

Made of AISI C-1018 steel — bright finish. For use where heat treatment is not required and where ordinary hexagon heads are satisfactory. Hexagon heads die made to size — not machined. Points machine turned. Tensile strength in accordance with SAE Grade 2. Carried in stock.

SET SCREWS

Square head and headless — cup point. Case hardened. Expertly made by the pioneers in producing Cup Point Set Screws by the cold upset process. Cup points machine turned. Carried in stock.

FILLISTER CAP SCREWS

Heads completely machined top and bottom. Milled slots — less burrs. Flat and chamfered machined point. Carried in stock.

FLAT HEAD CAP SCREWS

Heads completely machined top and bottom. Milled slots — less burrs. Flat and chamfered machined point. Carried in stock.

"SHINYLAND" STUDS

All studs made steam-tight on tap end unless otherwise specified, with flat and chamfered machined point. Nut end, oval point. Land between threads shiny, bright, mirror finish. Carried in stock.

ADJUSTING SCREWS

Valve tappet adjusting screws — Hexagon head style — to blue print specifications — hexagon head hard, polished if specified — threads soft to close tolerance — points machine turned, flat and chamfered.

CONNECTING ROD BOLTS

Made of alloy steel — heat treated — threads rolled or cut — finished to extremely close thread and body tolerances — body ground where specified. Expertly made by the pioneers in producing connecting rod bolts by the cold upset process.

SPRING BOLTS

Case hardened to proper depth and ground to close tolerances. Thread end annealed. Supplied in various head shapes, with oil holes and grooves of different kinds, and flats accurately milled.

FERRY PATENTED ACORN NUTS

For ornamental purposes. Steel insert — steel covered. Finish: plain, zinc plated, cadmium plated. Size: 9/16", 3/4", 15/16" across the flats.

Tapped 1/4" to 3/4" inclusive. Cross section of Ferry patented acorn nut, showing how steel hexagon nut fits snugly into shell.

Pioneers and Recognized Specialists, Cold Upset Screw Products since 1907

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See heavy duty jack . . . part of the most complete line of standard jigs and fixtures available.

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YOU GET THE BEST
All Lodding fixtures are carefully engineered, built of the highest quality materials and Parkerized to prevent rust.

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Immediate shipment from completely stocked coast-to-coast distributors.

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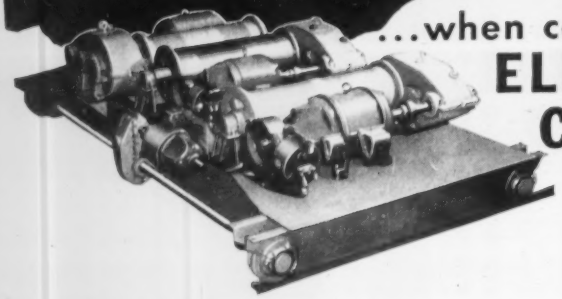
Scrutinize Trolley Details



...when considering ELECTRIC CRANES

WITH the exception of bridge movement all crane functions are dependent upon the trolley.

Hence the importance of carefully investigating this vital unit.

Here is a Euclid trolley that will withstand the most critical examination from wheels through welded base and in to the most minute details of all components.

It is 22 feet long and equipped with hoists of two capacities and controls to handle magnet and scrap grapple.

Similar expert attention to details is given to EUCLID Crane trolleys of all capacities. We invite your searching investigation.

Euclid Cranes

The EUCLID CRANE & HOIST Co.
1365 CHARDON ROAD
EUCLID, OHIO

Steel Bars . . .

(Concluded from page 154)

market conditions is noted in commercial steel bars. Mills can give prompt shipments and, as a result, consumers are inclined to order largely against needs as they arise. Absence of active automotive buying is keenly felt. Sellers are anxiously awaiting an upturn in demand from that direction. Generally, it is believed in the market that consumption is a lot heavier than is indicated by current buying, and that this means a spurt in ordering will develop once consumer inventories get down.

Boston—Changes in alloy extras, some up and others down, are accompanied by competitive selling with practically all tonnage moving at equalized prices, on both carbon and alloys. Grade extra reduction of $2 per ton on hot and cold-finished alloys with molybdenum 15 to 25 content is general. Stress relieving extra of 1.25c per pound on five grades of 400 series stainless bars and billets has been restored.

While bar demand is mostly for prompt shipment with more tonnage available from stock, buying for April is ahead of the March pace and a few orders are booked beyond.

Philadelphia—Sellers of hot-rolled carbon bars are a little more encouraged. Business is slow, but not so slow as it was. There are just enough signs to indicate that once mill deliveries begin to lengthen buying will spurt.

Inventories at some consumer plants have been allowed to get low. But as long as buyers can get tonnage on short notice they are not too concerned about replacing inventories. Cold-drawers report definite improvement.

Pittsburgh—Orders continue at a fair rate, but size of each order is small. March sales of cold-drawn bars may trail February tonnage. Several producers have trimmed operations to 3 or 4 days a week. More optimistic, in the view of producers, is the indication that fabricators' stocks are nearing a balance.

Plates . . .

Plate Prices, Page 142

Philadelphia—Some producers detect a mild though scarcely discernible uptrend in current trading. Others fail to note any increase, but agree buying is no worse, and demand is increasingly of a "rush" character, indicating consumer inventories are working down.

Pittsburgh—Sales are slowly dip-

ping, due to inventory adjustment rather than a weakness in requirements for plate. Ease of supply causes fabricators to cut stocks to a two-to-three week level.

Boston—Plate fabricating shops are booking more orders, mostly for tanks, but they are not buying all the tonnage needed to meet new requirements. Most are drawing from inventory. While current availability of plates continues, 2 to 3 weeks delivery on carbon grades, consumers are reluctant to buy in advance.

Weldment shops are operating on close schedules, buying sparingly, and the same applies to warehouses operating plate shops. For pulp and paper mill equipment, some moderate orders are placed. Mill schedules for April are wide open except for clad and a few specialties.

Los Angeles—Plate producers' order books are open for April. Currently tight, plate supplies are expected to improve by second quarter.

Seattle—Bids are in at Hanford Works for 4 water tanks involving in excess of 100 tons of plates. Several other tank projects are pending. Largest plate job is the oil pipeline from the Canadian border to Ferndale, Wash., for General Petroleum's refinery.

Tubular Goods . . .

Tubular Goods Prices, Page 145

New York—U. S. Steel Export Co. announces the following new export price bases with freight included to New York, Philadelphia and Baltimore; effective with shipments from mills Mar. 11:

American standard pipe, T & C, buttweld galvanized, 2½ and 3-inch, 17.65 per cent discount; buttweld galvanized, 3½ and 4-inch, 8.195 per cent discount; seamless galvanized pipe, 2-inch, plus 5.69 per cent discount; 2½-inch, plus 3.44 per cent; 3-inch, plus 0.94 per cent; 3½ and 4-inch, 0.56 per cent; 5-inch, plus 0.19 per cent; 6-inch, 2.31 per cent.

Pittsburgh—Oil country tubular goods continue to sell in strong volume but there is a drop in sales of line pipe.

San Francisco—Basalt Rock Co., Inc., Napa, Calif., which spent the bulk of $3,384,575 for capital additions in 1953 on a new pipe mill adjoining Kaiser Steel Corp.'s plant in Fontana, has a backlog of orders for all the company's products extending through June.

Seattle—Demand for cast iron pipe is slow but early improvement is expected as municipal seasonal requirements are covered.

WHATEVER THE SIZE

OR SHAPE . . .

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STEEL STRAPPING

will pack it quickly . . .

and at LOW COST

Whether your product is small or bulky, light or heavy, of regular or irregular shape, STANLEY Steel Strapping can give you one important answer to management's demands for greater cost savings in packing and shipping —

It will pay you to have your STANLEY Steel Strapping Specialist show you how to build modern, dollar-saving efficiency into your present materials handling operations.

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THE STANLEY WORKS, 2263 LAKE STREET, NEW BRITAIN, CONN.

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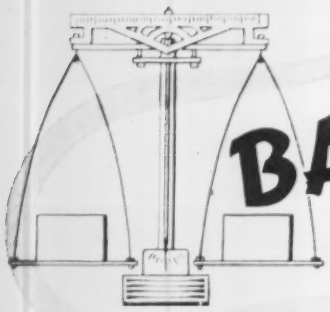

BALANCED FOR EASY WHEELING!

Equipped with steel wheel or wheel with zero pressure or pneumatic tire.

Model C5W with Pneumatic Tired Wheel and Wood Frame.

You'll find it so easy to wheel heavy loads in Sterling Barrows. Only a minimum of effort is required. Sterling's perfectly balanced construction permits 80% of the load to be carried on the wheel . . . only 20% by the operator. This increases efficiency . . . allows more loads to be hauled each day . . . reduces hauling costs.

ORDER NOW!

DEALER PLAN AVAILABLE. WRITE FOR DETAILS.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

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KNOWN FROM COAST TO COAST FOR CRANES OF RUGGED DEPENDABILITY

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MICHIGAN CRANE

YOUR BEST BUY . . . COMPARE THESE FEATURES

Every Michigan crane combines precision engineering and manufacturing with such important features as anti-friction bearings at all moving points on bridge and trolley, optional fluid couplings, and easily replaceable standard mill parts used throughout! Why not consult with our staff of material handling experts on your particular problem, with no obligation or cost?

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Wire . . .

Wire Prices, Page 144

Pittsburgh A "small landslide" of orders for merchant wire products swamped several manufacturers last week. The awaited seasonal upswing in demand for barbed wire, chain link fence and nails occurred suddenly. One mill, which had been taking orders for immediate delivery, began to book orders three weeks in advance. Distributors reentered the market to replenish their stocks. Demand for manufacturers wire remains low.

Boston Slight improvement in wire demand holds. Moderate gains in demand for consumer products and near rock-bottom inventories account for replacement orders, including cold heading. As to inventory, most consumers are holding stocks to 30 to 45 days, and orders for early shipment. Spring wire, mechanical and upholstery, is bought on that basis, but March bookings ended up slightly ahead of estimates. Competition in some wire-made products, certain type of screws, including wood, and other small fastenings, has bogged down prices to the point producers are about trading dollars at the expense of profit margins.

Chicago March business in manufacturers wire products probably will show an increase of between 10 and 15 per cent over January and February. April looks promising for further improvement. Merchant products too are up sharply but the influence is essentially seasonal. Warehouses are bolstering stocks to meet rural demands.

Structural Shapes . . .

Structural Shape Prices, Page 142

Pittsburgh Building and construction here continue to make an excellent showing. New construction awards in 27 counties of western Pennsylvania had a value of nearly $26 million in January, a high mark for the month.

First orders for steel to be used in the Ohio turnpike are reported in this area. Structural shapes are no longer hard to obtain, but delivery may be slow on light wide flange beams.

New York Structural demand is livelier and more diversified. There appears to be a particularly good spurt in small work. The largest new project in sight is the public coliseum for the Triborough Bridge & Tunnel Authority on which final plans have been filed, and on which structural bids may be asked within a couple

(Please turn to page 165)

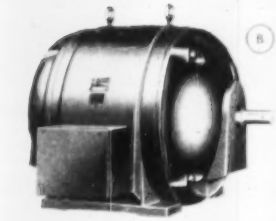
WHATEVER YOUR POWER REQUIREMENTS FOR *Original* EQUIPMENT.. THERE'S A

LIMA

A

RIGHT FOR THE JOB!

Built-in Dependability
Fast Delivery and Efficient Service



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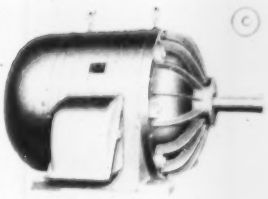

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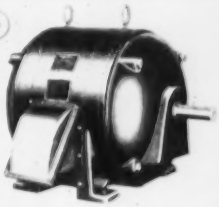

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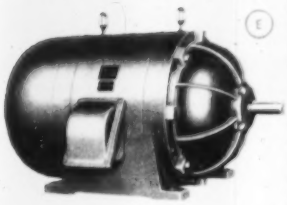

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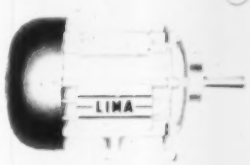

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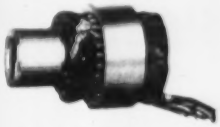

G

A Lima Type [illegible], semi-enclosed, drip-proof. Lima Type [illegible], totally enclosed, non-ventilated, NEMA frame sizes [illegible] to 284.

B Lima Type [illegible], semi-enclosed, drip-proof, NEMA frame sizes [illegible] to [illegible].

C Lima Type [illegible], totally enclosed, fan-cooled, NEMA frame sizes [illegible] to [illegible].

D Lima Type [illegible], semi-enclosed, drip-proof, NEMA frame sizes 284 to [illegible].

E Lima Type [illegible], totally enclosed, fan-cooled, NEMA frame sizes 284 to 445.

F Lima Type [illegible], totally enclosed, fan-cooled, NEMA frame sizes 224 to 326.

Lima Type [illegible], totally enclosed, fan-cooled, dust tight, U. L. Approved Class 2, Groups F & G, NEMA frame sizes 224 to 328.

Lima Type EX, totally enclosed, fan-cooled, explosion-proof, U.L. Approved Class 1, Group D, NEMA frame sizes 224 to 328.

G Lima Shell-type motors and complete special motors, made-to-order.

1/3 to 150 Horsepower

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CURRENT FERROALLOY QUOTATIONS

Prices as reported to STEEL

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton $86, Palmerton, Pa.; $87 Clairton and Duquesne, Pa.

(16 to 19% Mn) $84 per ton, Palmerton, Pa., $85 per ton, Clairton and Duquesne, Pa.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $266, Clairton, Duquesne, Johnstown and Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala., and Portland, Oreg.; add or subtract $2.66 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%) Lump $208 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 76%, fractions in proportion to nearest 0.1%.

Low Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 27.95c per lb of contained Mn, carload packed 28.7c, ton lots 29.8c, less ton 31.6c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices. 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max 75% C max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max) Add 2.0c to the above prices. Spot, add 0.25c.

Medium Carbon Ferromanganese: (Mn 80-85, C 1.5% max). Carload, lump, bulk 21.35c per lb of contained Mn, carload packed 22.1c, ton lot 23.2c, less ton 24.4c. Delivered. Spot, add 0.25c.

Manganese metal, 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 36.2c per lb of metal; packed, 36.9c; ton lot 38.4c; less ton lots 40.4c. Delivered. Spot, add 2c.

Electromanganese: Min. carloads, 30c; 2000 lb to min. carloads, 32c; 250 lb to 1999 lb, 34c; less than 250 lb, 37c. Premium for hydrogen-removed metal, 1.5c per lb, f.o.b. cars, Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-86%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 11.4c per lb of alloy, carload packed, 12.15c, ton lots 13.06c, less ton 14.05c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35; less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High Carbon: (Ti 15-18%, C 6.8%). Contract $177 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium Carbon: (Ti 17-21%, C 2-4.5%). Contract $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High Carbon Ferrochrome: Contract, c.l., lump, bulk 24.75c per lb of contained Cr; c.l. packed 25.65c, ton lot 26.80c, less ton 28.20c. Delivered. Spot, add 0.25c.

Low Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.025% C (Simplex) 34.50c per lb contained Cr, 0.03% C 36.50c, 0.04% C 35.50c, 0.06% C 34.50c, 0.10% C 34.00c, 0.15% C 33.75c, 0.20% C 33.50c, 0.50% C 33.25c, 1% C 33.00c, 1.50% C 32.85c, 2% C 32.75c. Carload packed add 1.1c, ton lot 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. 8 M x D, bulk, 26.25c per lb contained Cr. Packed, c.l. 27.15c, ton 28.50c, less ton 30.25c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8 M x D, 18.35c per lb of alloy, ton lot 19.2c; less ton lot, 20.4c, delivered, spot, add 0.25c.

Low Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 25.75c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 25.50c per pound of contained chromium plus 12.6c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Ferrochrome Silicon: No. 2 (Cr 36-39%, Si 26-30%, Al 7-9%, C 0.05% max), 25.75c per lb of contained chrome plus 12.4c per lb of contained silicon plus aluminum 3" x down, delivered.

Chromium Metal: (Min 97% Cr and 1% Fe) contract, 1" x D, packed, max 0.50%, carload $1.12, ton lots $1.14; less ton $1.16. Delivered. Spot, add 5c. Prices on 0.10 per cent carbon grade, add 4c to above prices.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 35-55%, Si 2-12% max, C 3-3.5% max). Contract, any quantity, $3.00 per lb of contained V. Delivered. Spot, add 10c. **Crucible-Special Grades** (V 35-55%, Si 2-3.5% max, C 0.5-1% max), $3.10. **Primos and High Speed Grades** (V 35-55%, Si 1.50% max, C 0.20% max) $3.20.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si, packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered. Spot, add 0.8c.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.0c per lb of contained Si, carload packed 18.2c, ton lot 19.15c, less ton 20.2c. Delivered. Spot, add 0.25c.

Silicon Metal: (Mn 97% Si and 1% max Fe) C.l. lump, bulk, regular 18.5c per lb of Si, c.l. packed 19.7c, ton lot 20.6c, less ton 21.6c. Add 0.5c for max. 0.10% calcium grade. Deduct 0.5c for max 2% Fe grade analyzing min 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.90c per lb of alloy, ton lots packed 11.30c, 20 to 1999 lb 11.65c, smaller lots 12.15c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max). Contract, c.l. lump, bulk 8.0c per lb of alloy, c.l. packed 8.75c, ton lot 9.6c, less ton 10.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, spot add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contact, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y.; freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20% Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.6c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Deld. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3% lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 16.25c per lb of briquet, carload packed 16.95c, ton 17.55c, less ton 18.65c. Deld. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 12.45c per lb of briquet, c.l. packaged 13.25c, ton lot 14.05c, less ton 14.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 12.65c per lb of briquet, c.l. packaged 13.45c, ton lot 14.25c, less ton 15.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.95c per lb of briquet. Packed c.l. 7.75c, ton lot 8.85c, less ton 9.45c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.1c. Packed c.l. 7.9c, ton lot 8.7c, less ton 9.6c. Delivered. Add 0.25c for notching. small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more, $3.80 per lb of contained W; 2000 lb W to 5000 lb W, $3.90; less than 2000 lb W, $4.02, f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 56-60%, Si 8% max, C 0.4% max.). Contract, ton lot, 2" x D, $9.50 per lb of contained Cb, less ton $9.55. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min, C 0.30% max) ton lots, 2" x D, $4.75 per lb of contained Cb plus Ta, deld.; less ton lots $4.80.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Deld. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.50c per lb of alloy; ton lots 18.50c; less ton lots 20c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 15c per lb of alloy; ton lots 16.50c; less ton lots 17.75c, f.o.b., Niagara Falls; freight allowed to St. Louis.

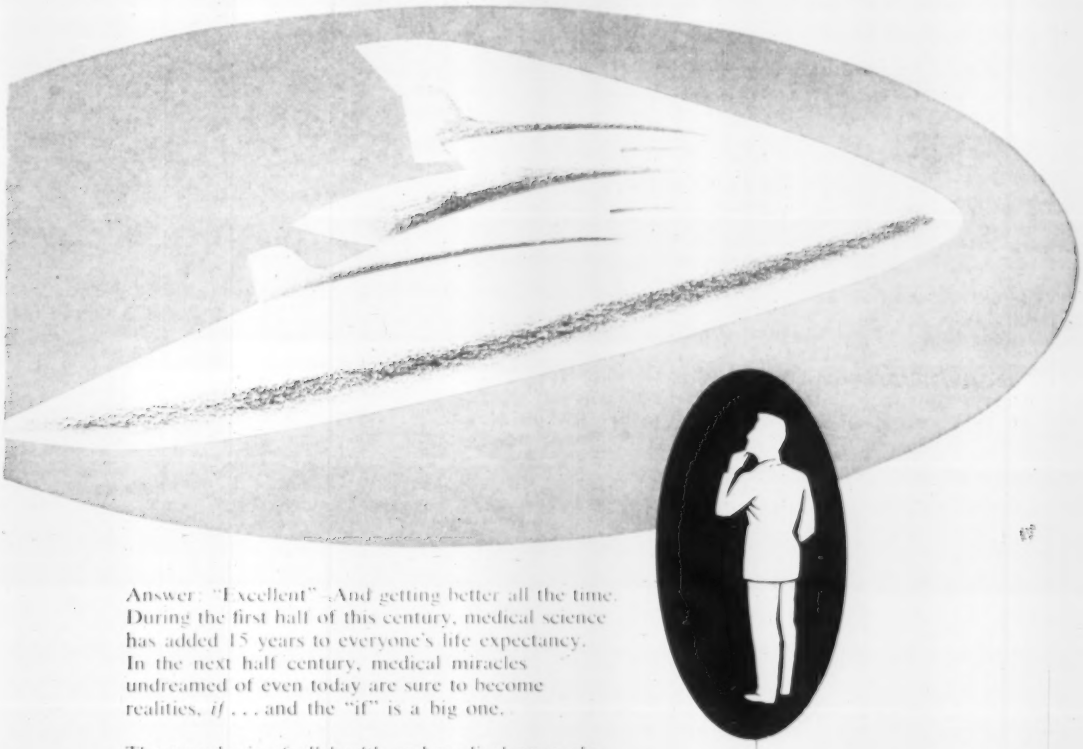
Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 14.50c. Packed c.l. 15.50c, ton lots, 15.75c, less ton lots, 16.25c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, f.o.b. Langeloth, $1.32 in all sizes except powdered which is $1.41; Washington, Pa., furnace, any quantity $1.32.

Technical Molybdic-Oxide: Per lb. contained Mo, f.o.b. Langeloth, Pa., $1.14 in cans; in bags, $1.13, f.o.b. Langeloth, Pa.; Washington, Pa., $1.13.

how are your chances of being around in 1999?



Answer: "Excellent". And getting better all the time. During the first half of this century, medical science has added 15 years to everyone's life expectancy. In the next half century, medical miracles undreamed of even today are sure to become realities, *if* . . . and the "if" is a big one.

The very basis of all health and medical research, the foundation without which no hospital or health agency can operate, is imperiled. That foundation is the country's compact network of 79 medical schools.

The threat is real and immediate . . . the production line of well-trained doctors is seriously endangered. Lack of operating funds has reduced teaching time by 7%, created vacancies in one out of every 20 full-time teaching positions, caused three private medical schools to become state institutions within the past-three years . . . and all of this at a time when demands of our expanding population and rapid scientific advances require the highest in teaching standards, and larger enrollments.

Hundreds of firms in industry have recognized this threat in its fullest implication. The contributions they are making to the National Fund constitute one of private enterprise's major services to the nation. At the same time these contributions serve as safeguards for their investments in family, community and employee health. Get full details on the crisis that faces medical education, and learn how you can help solve it.

NATIONAL FUND FOR MEDICAL EDUCATION

FACTS YOU SHOULD KNOW ABOUT MEDICAL EDUCATION

- There are only 79 accredited medical schools in the United States.
- They train 82,000 undergraduates, specialists and technicians and graduate 6,500 doctors annually.
- It costs from $10,000 to $12,000 to train a doctor today.
- Tuition fees, raised 84% over 1940, cover less than 20% of the cost.
- In the past decade medical teaching budgets have risen 143%; administration and plant operation 150%.
- The medical schools need $40,000,000 annually in additional income to maintain present standards and train the necessary number of doctors required for America's growing population.
- *ALL* 79 medical schools can be aided by a *single* gift to the National Fund for Medical Education.
- Contributions are distributed through annual grants according to a schedule approved by the medical schools.
- The National Fund is a voluntary, non-profit organization approved and supported by the American Medical Association and the Association of American Medical Colleges.

For complete facts on the crisis facing medical education write to

The National Fund for Medical Education,
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Slotted patterns from .006 wide, upword. Squares, triangles, ornamental and special shapes in a wide range of patterns, spacings and arrangements.

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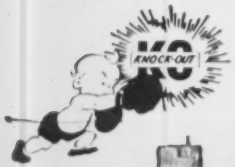
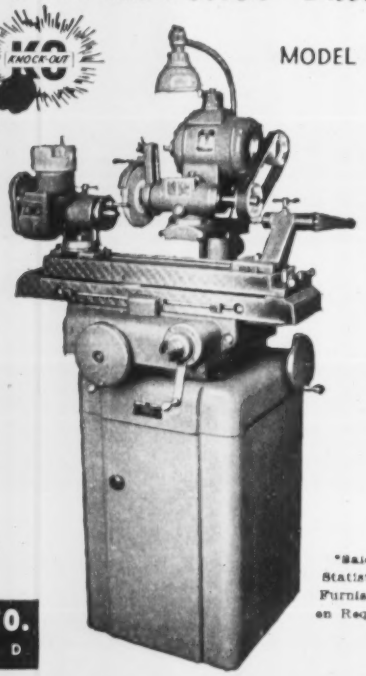


MODEL B860



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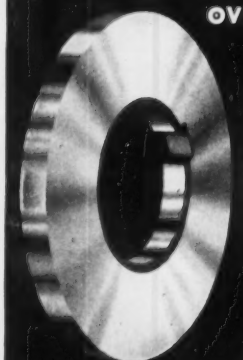

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ORES–COKE–REFRACTORIES

Prices as reported to STEEL; changes shown in *italics*.

ORES

Lake Superior Iron Ore

(Prices effective July 1, 1953, and thereafter, gross ton, 51.50% iron natural, rail of vessel, upper lake ports.)

Old range bessemer	$10.30
Old range nonbessemer	10.15
Mesabi bessemer	10.05
Mesabi nonbessemer	9.90
Open-hearth lump	11.15
High phosphorus	9.90

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon which were in effect on June 24, 1953, and increases or decreases after such date are for buyer's account.

Eastern Local Iron Ore

Cents per unit, deld E. Pa.

Foundry and basic 56-62% concentrates, contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%	22.00
North African hematite (spot)	20.00-22.00
Brazilian iron ore, 68-69% (spot)	25.00

Tungsten Ore

Net ton unit, before duty

Foreign Wolframite min. 60%, WO_3	23.80
Domestic scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, $1.12 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, $1.05-$1.07.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.:

Indian and African

48% 2.8:1	$40.00-$42.00
48% 3:1	44.00-46.00
48% no ratio	32.00-34.00

South African Transvaal

44% no ratio	$24.00-$26.00
48% no ratio	34.00

Domestic

(Rail nearest seller)

48% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb Mb content mines, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

50-60%	$2.40-$2.80
65% min.	$3.40-$3.50

Vanadium Ore

Cents per lb V_2O_5 content, deld mills

Domestic	31.00

REFRACTORIES

Fire Clay Brick

High-Heat Duty: Pueblo, Colo., $89; Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., Woodbridge, N. J., $109; Salina, Pa., $114; Niles, O., $120; Los Angeles, Pittsburg, Calif., $132.30.

Silica Brick

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., $115; Warren, O., Hays, Pa., $120; Niles, O., $120; E. Chicago, Ind., Joliet, Rockdale, Ill., $125; Cutler, Utah, $116.55; Los Angeles, $122.85.

Insulating Fire Brick

2300° *F*: Massillon, O., $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $206; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala., $212.80.

Ladle Brick

Dry Pressed: Bessemer, Ala., $64.60; Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Wellsville, O., $77.50; Mexico, Mo., $73.50; Clearfield, Pa., Portsmouth, O., $83; Perla, Ark., $109; Los Angeles, $110.25; Pittsburg, Calif., $111.30.

Sleeves

Reesdale, Pa., $139.70; Johnstown, Pa., $140; Clearfield, Pa., $148.50; St. Louis, $151.80; Athens, Tex., $155.

Nozzles

Reesdale, Pa., $223.50; Johnstown, Pa., $228.20; Clearfield, Pa., $241.40; St. Louis, $247.10; Athens, Tex., $247.70.

Runners

Reesdale, Pa., $174; Johnstown, Pa., $177.80; Clearfield, Pa., $185.50; St. Louis, $187.30; Athens, Tex., $181.80.

High-Alumina Brick

50 *Per Cent*: Clearfield, Pa., St. Louis, Mexico, Mo., $179; Danville, Ill., $169.30.

60 *Per Cent*: St. Louis, Mexico, Vandalia, Mo., $223.00; Danville, Ill., $213.20.

70 *Per Cent*: St. Louis, Mexico, Vandalia, Mo., $225; Danville, Ill., $258; Clearfield, Pa., $252.

Dolomite

Domestic, dead-burned bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Narlo, Gibsonburg, Woodville, O., $14.50; Thornton, McCook, Ill., $14.60; Dolly Siding, Bonne Terre, Mo., $13.65.

Magnesite

Domestic, deadburned bulk; Luning, Nev., $38.

METALLURGICAL COKE

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.50-$15.00
Connellsville, foundry	16.50-17.00

Oven Foundry Coke

Kearney, N. J., ovens	$21.00
Everett, Mass., ovens	
New England, deld	*26.00
Chicago, ovens	24.50
Chicago, deld	26.00
Terre Haute, ovens	24.05
Milwaukee, ovens	25.25
Indianapolis, ovens	24.25
Chicago, deld	28.12
Cincinnati, deld	25.85
Painesville, O., ovens	24.50
Cleveland, deld	27.43
Erie, Pa., ovens	25.00
Birmingham, ovens	22.65
Cincinnati, deld	27.58
Lone Star, Tex., ovens	18.50
Philadelphia, ovens	23.95
Swedeland, Pa., ovens	23.85
St. Louis, ovens	
St. Louis deld	26.00
St. Paul, ovens	23.75
Portsmouth, O., ovens	24.00
Cincinnati, deld	26.62
Detroit, ovens	25.50
Detroit, deld	26.50
Buffalo, deld	28.08
Flint, deld	28.23
Pontiac, deld	27.06
Saginaw, deld	28.58

*Or within $4.55 freight zone from works.

COAL CHEMICALS

Spot, cents per gallon, ovens

Pure benzol	40.00
Toluol, one deg	32.00-35.00
Industrial xylol	32.00-35.00

Per ton, bulk, ovens

Sulphate of ammonia	$44 $47
Birmingham area	45.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol, 40 deg. (U.S.P.), tank cars	18.00
c.l. drums	19.00
l.c.l. drums	19.50

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Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF$_2$ content 72.5%, $44; 70%, $42.50; 60%, $38. Imported, net ton, duty paid, metallurgical grade, $35-$36.

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Inches Diam	Length	Per 100 lb
2	24	$43.50
2½	30	28.00
3	40	27.25
4	40	26.00
5½	40	25.75
6	60	23.25
7, 8, 9, 10	60	21.00
12, 14	72	20.50
16	72	20.00
17	60	20.50
18	72	20.50
20	72	20.00

CARBON

40	100	$8.55
40, 35, 30	110	8.55
30	84	9.10
24	96	8.50
24	72, 84	9.10
20	60	8.55
20	84	9.10
17	72	9.10
17	60	9.50
14	72	9.50
14, 12, 10	60	10.30
8	60	10.55

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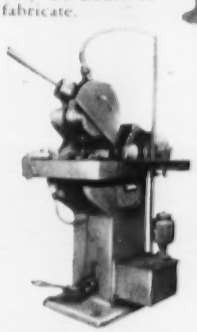

Original design required 1048 lbs. of castings bolted together. Each casting required costly machining and fitting.

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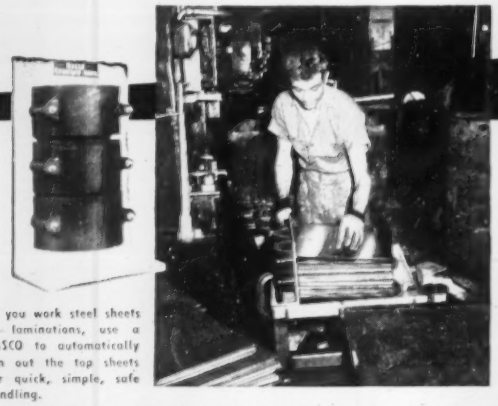

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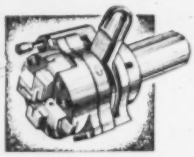

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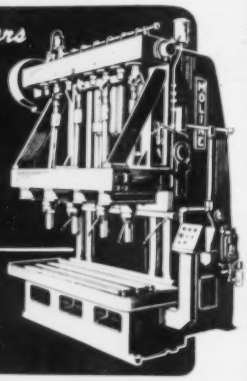

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Structural Shapes . . .

(concluded from page 158)

of months. According to some preliminary estimates, the project will require more than 20,000 tons.

Boston—With estimates in on two hangars, 4500 tons, airfield base construction, mostly at Portsmouth, N. H., and Bedford, Mass., supports fabricated structural steel inquiry. Bridges and other public projects, chiefly schools, hospitals and institutions, loom as heavy consumers with some decline in private and industrial building.

Philadelphia—Structural awards are confined principally to projects running less than 100 tons each. These are subject to much competition among the smaller shops. The larger fabricators are sharpening their pencils, for while they have backlogs of several months, they also are interested in some of the smaller projects which they can work into their schedules.

Chicago—Although heavy building construction is strong and has every prospect for continuing so, structural mills are catching up with their orders. Generally, shipments of shapes are in the range of 2 to 4 weeks.

Pig Iron . . .

Pig Iron Prices, Page 146

New York—Feeling in the trade is a little better, but merchant pig iron sellers report no improvement in sales. Some doubt if April business will mark any particular turn for the better. Nevertheless, the majority of sellers believe if a betterment doesn't come in April it will do so in May.

Buffalo—Increased use of hot metal for ingot production is a major factor in holding pig iron production at the present level. Reports from foundries are not too encouraging.

Philadelphia—Pig iron business shows little improvement. Gray iron shops still operate on a restricted basis except for the pipe foundries. The larger of the two stacks at Swedeland, Pa., is expected to go down around the middle of next month for repairs.

Certain of the larger pipe shops in this area are showing more interest in foreign iron, but so far as can be learned no new buying developed. Foreign offerings are principally from Germany, Spain and Sweden, and average around $48 to $49 on cars, duty paid, Philadelphia, which is substantially lower than domestic prices.

Cleveland—Merchant pig iron demand continues sluggish though some foundries are taking in tonnage in substantial volume right along. However, foundry operations in general are spotty and this is reflected in a tendency to order pig iron needs as they arise.

Chicago—Foundry melt in March has brighter aspects and pig iron shipments will exceed the previous two months. There is evidence consumers have reduced stocks to the bone, since sellers are getting occasional calls for small tonnages for quick shipment. Active blast furnaces in the district at 32 of 43 is lowest since February 1950.

Iron Ore . . .

Iron Ore Prices, Page 163

Cleveland—Stocks of iron ore on lower lake docks and at furnaces totaled 36,385,842 gross tons on Mar. 1, reports the Lake Superior Iron Ore Association. This compares with 11,974,242 tons on Feb. 1, and with 29,948,749 tons on Mar. 1, 1953.

Consumption of lake ore during February amounted to 5,786,725 gross tons. This was a decline compared with 6,995,621 tons in January, and was off sharply compared with consumption of 7,395,994 tons in February a year ago.

On Mar. 1 147 blast furnaces out of a total of 204 in this country and Canada were active. This compares with 148 on Feb. 1, and with 192 on Mar. 1, 1953.

Youngstown—U. S. Steel Corp.'s Ohio Works here will put into operation about Apr. 10 the first of two new ore bridges being built as part of a multi-million dollar expansion. The bridges will handle about 3320 tons of ore per hour, giving better blending and speedier service.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

21,500 tons, Seeley Vacuum office building, Lexington Ave. and Forty-second St., New York, through Turner Construction Co. to American Bridge Division, U. S. Steel Corp., Pittsburgh.

5800 tons, concentrating plant, Erie Mining Co., Aurora, Minn., to Bethlehem Steel Co., Bethlehem, Pa.

1100 tons, building, Rust Craft Corp., Dedham, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Aberthaw Construction Co., Boston, general contractor.

872 tons, bridge, state thruway, Orange county, New York, to Bethlehem Steel Co., Bethlehem, Pa.

740 tons, south east wing, research laboratory, General Electric Realty Corp., Schenectady, N. Y., through Tupper & Griggs, to Bethlehem Fabricators, Bethlehem, Pa.

500 tons, office and factory building, General Electric Realty Corp., Holland, Mich., to Mississippi Valley Structural Steel Co., St. Louis.

420 tons, medical school residence, Yale University, New Haven, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Dwight Building

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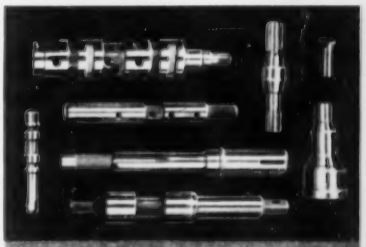

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Co., New Haven, general contractor.

620 tons, high school, Uniondale, N. Y., through Leon D. De Matties Construction Co., to the Mansfield Iron Works, St. Louis.

240 tons, office, Morristown, N. J., through Walter Kidde Construction, Inc., to the LaFayette Iron Works, Jersey City, N. J.

200 tons, substation steel, to Screw Machine Products Co., Portland, Oreg., low $84,920, to Bonneville Power Administration, Portland, Oreg.

301 tons, galvanized transmission towers, Connecticut Light & Power Co., Southbury, Conn., to Riaw Knox Co., Pittsburgh.

165 tons, state bridge, Middlesex county, New Jersey, through J. F. Chapman & Son, to Bethlehem Steel Co., Bethlehem, Pa.

160 tons, addition, St. Luke's Hospital, Bethlehem, Pa., to Bethlehem Contracting Co., that city.

100 tons, rebuilding state highway truss bridge, Montague, Mass., to Hartmann Structural Steel Co., Holyoke, Mass.; Warner Co., Sunderland, Mass., general contractor.

STRUCTURAL STEEL PENDING

1,740 tons, bridges, West Virginia turnpike, bids Mar. 30, to be let under one contract No. 67, or three separate contracts, Charleston, W. Va.

1200 tons, double cantilever maintenance hangar, Larson Air Field, James C. Barnes Construction Co., Seattle, low $1,973,434, to U. S. Engineer, Walla Walla, Wash.

900 tons, state bridge, Allegheny county, Pittsburgh, bids Apr. 15.

850 tons, state highway bridge, Charlemont, Mass., Daniel O'Connell's Sons Co., Holyoke, Mass., low, general contract.

740 tons, George creek bridge, Skagit power project, bids to Seattle, Apr. 20.

700 tons, Cowlitz river bridge, Washington State Poole, McGonagle & Dick, Portland, Oreg., low $73,413, to Bureau of Public Roads, Portland, Oreg.

540 tons, substructure, Kingston-Rhinecliff bridge over the Hudson river, New York State Bridge Authority, bids Apr. 20; also 1250 tons of reinforcing steel and 100,000 linear feet of steel bearing piles.

225 tons, I-span slab bridge on I-beams, F. E. Everett turnpike, Nashua, N. H., bids Mar. 21, Concord, Mass.; also 85 tons, reinforcing bars, and 20 tons, steel bearing piles.

113 tons, also steel piling, Idaho state, Sandpoint bridge, bids to Boise, Idaho, Apr. 6.

110 tons, 87-foot welded deck plate girder bridge, Pennichuck brook, Nashua-Merrimack, N. H., bids Apr. 1, Concord; also 65 tons, steel bearing piles.

Unstated tonnage, $30,000,000 public coliseum, Triborough Bridge & Tunnel Authority, New York, request for bids expected in about two months; project which will be located west of Columbus Circle will have four exhibition halls totaling 272,362 square feet and a 20-story office building; excavation for certain foundation work will begin at once.

REINFORCING BARS . . .

REINFORCING BARS PLACED

340 tons, canal lining project, Columbia Basin, to Bethlehem Pacific Coast Steel Corp., Seattle.

210 tons, grain elevator, Grass Valley, Oreg., to Bethlehem Pacific Coast Steel Corp., Seattle.

150 tons, Sacred Heart Hospital, Spokane, Wash., to Soule Steel Co., Portland, Oreg.

REINFORCING BARS PENDING

2000 tons, Seattle postoffice terminal; bids in.

1350 tons, substructure, Kingston-Rhinecliff bridge over the Hudson river, New York State Bridge Authority, bids Apr. 20; also required are 200 tons of structural steel and 100,000 linear feet of steel bearing piles.

800 tons, Idaho state Sandpoint bridge, bids to Boise, Idaho, Apr. 6.

270 tons, maintenance hangar, Moses Lake, Wash., Larson Air Field, bids in to U. S. Engineer, Walla Walla, Wash.

200 tons, Washington Athletic Club addition, Seattle, bids Mar. 23.

135 tons, laboratory, Ladd Air Field, Alaska, Chris Berg, Seattle, low.

125 tons, 3 bridge foundations, section 2, Augusta extension, Maine turnpike, Grey and New Gloucester, Me.

114 tons, also miscellaneous, Idaho state bridge, Bingham county, bids to Boise, Idaho, Apr. 6.

PLATES . . .

PLATES PLACED

100 tons, H-piling, Scott Paper Co., deep water pier, Everett, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle.

PLATES PENDING

500 tons or more, 10 steel material barges, bids in to Corps of Engineers, Memphis, Tenn.

100 tons plus, four storage tanks, 100,000-gal. each, Hanford Atomic Works, W. E. Caldwell Co., Louisville, Ky., low $77,600, to Atomic Energy Commission.

100 tons, storage tank, Weyerhaeuser Timber Co., Longview, Wash.; American Pipe & Construction Co., Portland, Oreg., low.

PIPE . . .

CAST IRON PIPE PLACED

1,956 tons, water main and appurtenances, Queens, New York, through Tibbets Contracting Co., to Bethlehem Steel Co., Bethlehem, Pa.

350 tons, 4 to 8-in. water mains, for Marysville, Wash., to Pacific States Cast Iron Pipe Co., Seattle, low $61,511.

STEEL PIPE PENDING

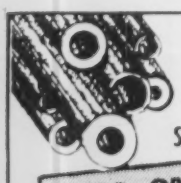
Unstated, 2045 feet 18-in. water mains, bids to R. G. Fredekind, clerk, Moscow, Idaho.

RAILS, CARS . . .

RAILROAD CARS PLACED

North American Car Corp., 275 forty-ton refrigerator cars, to Pacific Car & Foundry Co., Renton, Wash.

Union Pacific, 20 dome passenger cars, to American Car & Foundry Co., New York.



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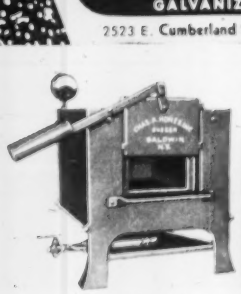
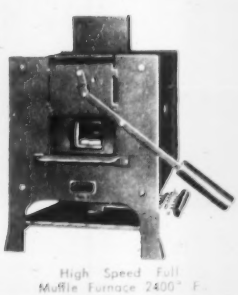


Bench Type Oven Furnace 2000° F.



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Scrap Market Tone Slightly Firmer

Price decline on steelmaking grades appears to be halted at least temporarily. Trade resisting further drop though little new buying is in evidence to provide support

Scrap Prices, Page 168

Washington—Scrap for consumption (purchases plus home scrap production) in January was 544,000 tons or 11 per cent less than in December, reports the Bureau of Mines. This, coupled with a decline in production of pig iron led to a slight reduction in inventories of ferrous materials in spite of the lowest consumption, exclusive of strike months, since March, 1950.

Stocks of ferrous scrap held by consumers decreased 128,000 tons from December, totaling 6,257,000 tons. This was the first decrease since October. The 34,000 ton reduction in stocks of pig iron, 2,466,000 tons, was the first in nine months. Scrap supplied 48 per cent of the total charge of ferrous materials in January; this compares with 51 per cent for the year 1953.

Cleveland—Despite the absence of active mill buying prices on steelmaking grades of scrap are unchanged. Indications are the long decline in the market at least has been temporarily halted, resistance to further decline reflecting renewed hopes of a spring revival in steelmaking operations and the fact that collections are discouraged by the low prices prevailing.

Pittsburgh—Market sources believe prices have reached rock bottom, although small purchases of blast furnace grades could probably be made slightly below prevailing quotations. With no improvement in orders, scrap collection has slowed to about half the rate of last year.

Buffalo—Sentiment is somewhat improved among scrap dealers who are hoping for a break in the mill buying stalemate. Continued active buying of cast scrap by Canadian consumers is a factor for renewed strength in the market.

Cincinnati—Purchase of machine shop turnings and short shovel turnings pushed up prices $1 and $2 a ton, respectively. No. 1 railroad heavy melting also appears stronger, and is quoted $1 higher. The flow of scrap has dried up at present price levels.

Chicago—A stronger position for No. 2 heavy melting steel and No. 1 dealer bundles has developed here in an otherwise colorless scrap market. The former is up $1 to $23 a ton, and the latter advanced $3 in the last week on a mill purchase to $27. Supply of No. 2 heavy melting has pretty well dried up since little auto wrecking is being done currently. Without a market for No. 2 bundles incentive for preparing and handling dealer material is lacking.

Philadelphia—Prices on major grades of open-hearth scrap again are unchanged with a little buying of No. 1 heavy melting and No. 1 bundles at $22, No. 2 heavy melting at $20 and No. 2 bundles at $18.

Some sellers believe the decline has about run its course, although admitting there hasn't been enough trading to provide the market with a real test.

Detroit—Scrap prices are unchanged in this area but the general feeling in the market is that the bottom of the decline has about been reached. Most observers expect some upturn in purchasing now that spring is here and bargain hunters realize prices will probably rise.

Birmingham—Dealers and brokers report virtual absence of scrap demand. Prices are weak and still tending downward. A small volume of melting steel continues to move to other districts.

Los Angeles—Scrap movement is moderate. Slight quickening of demand is not enough to cause any change in prices.

New York—Elements of strength are appearing in scrap. Railroads are holding on to more of their scrap, little yard scrap is being collected, and yardmen appear unwilling to sell bundled scrap at prices that cost them more to bale than they actually receive.

Brokers, having increasing trouble covering on scrap already sold, are discarding minimum prices and are offering a flat price of $14 for No. 1 heavy melting steel and No. 1 bundles, $12 on No. 2 heavy melting, and $10 for No. 2 bundles.

Boston—Steel scrap prices, shipping point, are at a level on some grades where the cost of hauling to normal large consuming points is higher than that paid for tonnage at originating yards. This is applicable to heavy melting to Pittsburgh and Sparrows Point where the rail freights, including federal tax, are $12.74 and $9.87, respectively.

Consumers in this area will not pay more than $4 to $5 freight and are getting all the tonnage wanted.

Dealers will pay no more than $7 to $8 for unprepared steel scrap.

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IRON AND STEEL SCRAP

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Mar. 25	$24.33
Mar. 18	24.33
Feb. Avg.	26.91
Mar. 1953	44.05
Mar. 1949	34.60

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer plant)

No. 1 heavy melting	25.00-26.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	25.00-26.00
No. 2 bundles	21.00-22.00
No. 1 busheling	25.00-26.00
Machine shop turnings	12.00-13.00
Mixed borings, turnings	12.00-13.00
Short shovel turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut structurals	27.00-28.00
Heavy turnings	26.00-27.00
Punchings & plate scrap	*27.00-28.00*
Electric furnace bundles	28.00-29.00

Cast Iron Grades

No. 1 cupola	35.00-36.00
Charging box cast	33.00-34.00
Heavy breakable cast	30.00-31.00
Unstripped motor blocks	24.00-25.00
No. 1 machinery cast	42.00-43.00

Railroad Scrap

No. 1 R.R. heavy melt	*27.50-28.50*
Rails, 2 ft and under	*44.00-45.00*
Rails, 18 in. and under	*45.00-46.00*
Rails, random lengths	*48.00-49.00*
Railroad specialties	34.00-35.00

Stainless Steel Scrap
(F.o.b. shipping point)

18-8 bundles & solids	165.00-170.00
18-8 turnings	85.00-90.00
430 bundles & solids	85.00-87.00
430 turnings	60.00-62.00

CLEVELAND

(Delivered consumer plant)

No. 1 heavy melting	20.00-21.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	20.00-21.00
No. 2 bundles	15.00-16.00
No. 1 busheling	20.00-21.00
Machine shop turnings	8.00-9.00
Mixed borings, turnings	12.00-13.00
Short shovel turnings	12.00-13.00
Cast iron borings	12.00-13.00
Low phos	22.00-23.00
Alloy free, short shovel turnings	13.00-14.00
Electric furnace bundles	20.00-21.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	23.00-24.00
Stove plate	33.00-34.00
Heavy breakable cast	22.00-23.00
Unstripped motor blocks	21.00-22.00
Brake shoes	27.00-28.00
Clean auto cast	38.00-39.00
No. 1 wheels	30.00-31.00
Burnt cast	27.50-28.50
Drop broken machinery	38.00-39.00

Railroad Scrap

No. 1 R.R. heavy melt	25.00-26.00
R.R. malleable	38.00-39.00
Rails, 3-ft and under	41.00-42.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	37.00-38.00
Cast steel	32.00-33.00
Railroad specialties	32.00-33.00
Uncut tires	34.00-35.00
Angles, splice bars	38.00-39.00
Rails, rerolling	38.00-39.00

Stainless Steel
(F.o.b. shipping point)

18-8 bundles, solids	nom 160.00-170.00
18-8 turnings	nom 70.00-80.00
430 clips, bundles, solids	nom 70.00
430 turnings	40.00-50.00

YOUNGSTOWN

(Delivered consumer plant)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	23.00-24.00
No. 2 bundles	18.00-19.00
Machine shop turnings	9.00-10.00
Short shovel turnings	15.00-16.00
Cast iron borings	15.00-16.00
Low phos	25.00-26.00
Electric furnace bundles	24.00-25.00

Railroad Scrap

No. 1 R.R. heavy melt	26.00-27.00

PHILADELPHIA

(Delivered consumer plant)

No. 1 heavy melting	22.00
No. 2 heavy melting	20.00
No. 1 bundles	22.00
No. 2 bundles	18.00
No. 1 busheling	22.00*
Electric furnace bundles	25.00-25.50
Machine shop turnings	11.00
Mixed borings, turnings	11.00
Short shovel turnings	16.00*
Structurals & plate	26.00-27.00
Heavy turnings	20.00
Couplers, springs, wheels	30.00
Rail crops 2 ft & under	40.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Malleable	38.00-39.00
Heavy breakable cast	36.50-37.50
Unstripped motor blocks	28.00*
Drop broken machinery	40.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*14.00*
No. 2 heavy melting	*12.00*
No. 1 bundles	*14.00*
No. 2 bundles	*10.00*
Machine shop turnings	4.00*
Mixed borings, short turnings	6.00*
Low phos. (structural & plate)	20.00
Short shovel turnings	8.00-9.00*

Cast Iron Grades

No. 1 cupola	29.00-30.00
Unstripped motor blocks	21.00-22.00*

Stainless Steel

18-8 sheets, clips, solids	160.00-165.00
18-8 borings, turnings	75.00-80.00
430 sheets, clips, solids	40.00
410 sheets, clips, solids	30.00

*Nominal.

BOSTON

(Brokers' buying prices, f.o.b. shipping point)

No. 1 heavy melting	13.25-15.00
No. 2 heavy melting	9.25-11.25
No. 1 bundles	13.25-14.25
No. 2 bundles	7.25-9.25
Machine shop turnings	3.00-3.50
Mixed borings, turnings	3.00-3.50
Short shovel turnings	6.50-7.00
No. 1 cast	29.00-30.00
Mixed cupola cast	27.00-28.00
No. 1 machinery cast	36.00-37.00

CINCINNATI

(Brokers' buying prices, f.o.b. shipping point)

No. 1 heavy melting	22.00-23.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	22.00-23.00
No. 2 bundles	16.00-17.00
No. 1 busheling	22.00-23.00
Machine shop turnings	*9.00-10.00*
Mixed borings, turnings	10.00-11.00
Short shovel turnings	*12.00-14.00*
Cast iron borings	10.00-11.00
Low phos. 2 ft-in	29.00-30.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	28.00
Charging box cast	30.00
Drop broken machinery	40.00

Railroad Scrap

No. 1 R.R. heavy melt	*26.00-27.00*
Malleable	32.00-33.00
Rails, 18 in. and under	42.00-43.00
Rails, random lengths	34.00-35.00

CHICAGO

No. 1 heavy melting	25.00-26.00
No. 2 heavy melting	*22.00-24.00*
No. 1 factory bundles	26.00-27.00
No. 1 dealer bundles	*26.00-27.00*
No. 2 bundles	17.00-19.00
No. 1 busheling	24.00-26.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	9.00-10.00
Short shovel turnings	11.00-12.00
Cast iron borings	11.00-12.00
Cut structurals, 3-ft	26.00-30.00
Punching & plate scrap	25.00-30.00
Electric furnace bundles	28.00-29.00

Cast Iron Grades

No. 1 cupola	32.00-34.00
Stove plate	27.00-28.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	36.00-38.00
Drop broken machinery	36.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt	*27.50-28.50*
R.R. malleable	*39.00-40.00*
Rails, 2-ft and under	40.00-41.00
Rails, 18-in. and under	41.00-42.00
Angles, splice bars	35.00-36.00
Rails, rerolling	*44.00-45.00*

Stainless Steel Scrap

18-8 clips & solids	130.00-140.00
18-8 turnings	60.00
430 clips & solids	42.00
430 turnings	22.00-25.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 1 heavy melting	16.00
No. 2 heavy melting	14.50
No. 1 bundles	17.00
No. 2 bundles	14.50
No. 1 busheling	17.00
Machine shop turnings	5.00
Mixed borings, turnings	5.00
Short shovel turnings	8.00
Punchings & plate scrap	19.00

Cast Iron Grades

No. 1 cupola	36.00
Charging box cast	25.00
Stove plate	28.00
Heavy breakable	25.00
Unstripped motor blocks	18.00
Clean auto cast	40.00
Malleable	28.00

BUFFALO

No. 1 heavy melting	23.50-24.50
No. 2 heavy melting	20.50-21.00
No. 1 bundles	23.50-24.50
No. 2 bundles	18.50-19.00
No. 1 busheling	23.50-24.50
Machine shop turnings	11.00-12.00
Mixed borings, turnings	13.00-13.50
Short shovel turnings	15.00-15.50
Cast iron borings	13.00-13.50
Low phos	27.50-28.50

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	33.00-34.00
No. 1 machinery	37.00-38.00

Railroad Scrap

Rails, random lengths	31.50-32.50
Rails, 2-ft and under	36.50-37.50
Railroad specialties	34.50-35.50

BIRMINGHAM

No. 1 heavy melting	19.00-20.00
No. 2 heavy melting	17.00-18.00
No. 1 bundles	19.00-20.00
No. 2 bundles	15.00-16.00
No. 1 busheling	19.00-20.00
Cast iron borings	13.00-14.00
Short shovel turnings	14.00-15.00
Machine shop turnings	12.00-13.00
Electric furnace bundles	25.00-26.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	39.00-40.00
Charging box cast	28.00-29.00
Stove plate	36.00-37.00
Bar crops and plate	28.00-29.00
Structural, plate 2 ft	28.00-29.00
Heavy breakable cast	28.00-29.00
Unstripped motor blocks	32.00-33.00
No. 1 wheels	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt	23.00-24.00
Rails, 18 in. and under	39.00-40.00
Rails, random lengths	32.00-33.00
Angles, splice bars	35.00-36.00
Stand. steel axles	35.00-36.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	24.00
No. 2 heavy melting	22.00
No. 1 bundles	24.00
No. 2 bundles	19.00
Machine shop turnings	6.00
Short shovel turnings	8.00

Cast Iron Grades

No. 1 cupola	35.00
Charging box cast	26.00
Heavy breakable cast	23.00
Unstripped motor blocks	23.00
Brake shoes	30.00
Clean auto cast	37.00
Stove plate	27.00

Railroad Scrap

No. 1 R.R. heavy melt	29.00
Rails, 18-in. and under	36.00
Rails, random lengths	33.00
Rails, rerolling	35.00
Uncut tires	30.00
Angles, splice bars	33.00

SEATTLE

(Delivered consumer plant)

No. 1 heavy melting	*24.00*
No. 2 heavy melting	*19.00*
No. 1 bundles	22.00
No. 2 bundles	16.00
No. 3 bundles	13.00
Machine shop turnings	11.50
Mixed borings, turnings	11.50
Short shovel turnings	11.50
Electric furnace, No. 1	35.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	35.00-37.00
Heavy breakable cast	25.00-32.00
Unstripped motor blocks	23.00
No. 1 wheels	*41.00*
Stove plate (f.o.b. plant)	29.00

Railroad Scrap
(Delivered consumer plant)

Rails, random lengths	30.00-34.00

SAN FRANCISCO

No. 1 heavy melting	20.00
No. 2 heavy melting	16.00
No. 1 bundles	19.00
No. 2 bundles	16.00
No. 1 busheling	20.00
Machine shop turnings	5.00
Mixed borings, turnings	5.00
Short shovel turnings	9.00
Cast iron borings	9.00
Cut structurals	25.00
Heavy turnings	9.00
Punchings & plate scrap	25.00
Electric furnace bundles	19.00

Cast Iron Grades

No. 1 cupola	39.00
Charging box cast	35.00
Stove plate	37.00
Heavy breakable cast	36.00
Unstripped motor blocks	29.00
Brake shoes	35.00
Clean auto cast	39.00
No. 1 wheels	38.00
Burnt cast	23.00
Drop broken machinery	43.00

LOS ANGELES

No. 1 heavy melting	20.00
No. 2 heavy melting	16.00
No. 1 bundles	18.00
No. 2 bundles	16.00
Machine shop turnings	5.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	35.00-38.00

HAMILTON, ONT.

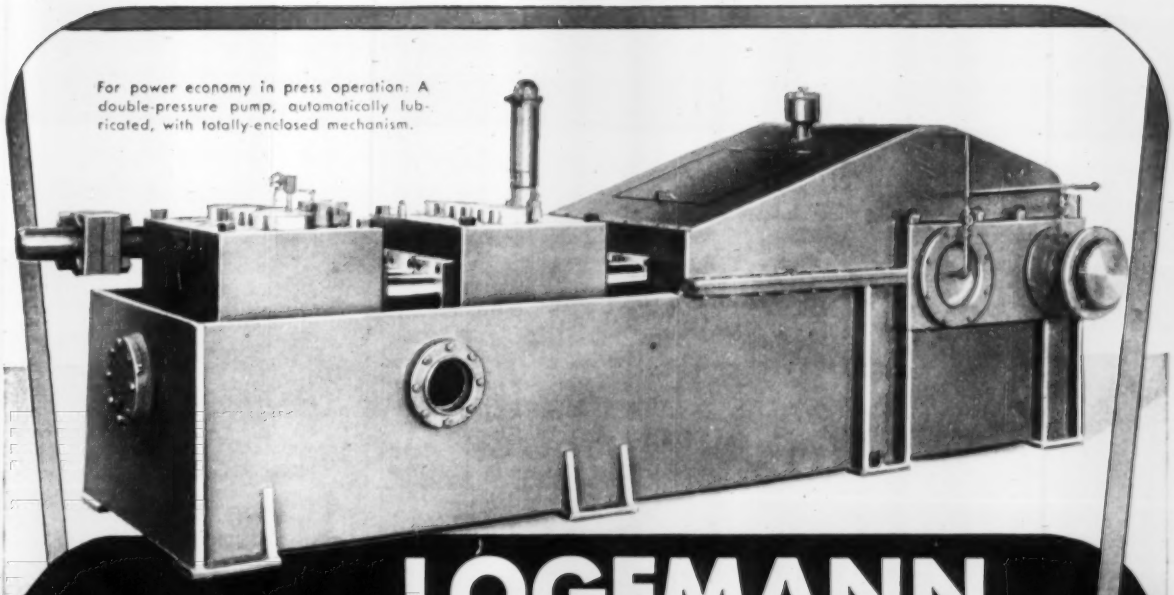
(Delivered prices)

No. 1 heavy melting	$23.00
No. 2 heavy melting	21.00
No. 1 bundles	23.00
No. 2 bundles	18.00
Mixed steel scrap	18.00
Mixed borings, turnings	13.00
Rails, remelting	33.00
Busheling, new factory:	
Prepared	22.00
Unprepared	18.00
Short steel turnings	13.00

Cast Iron Grades†

No. 1 machinery cast	42.00

†F.o.b. shipping point.



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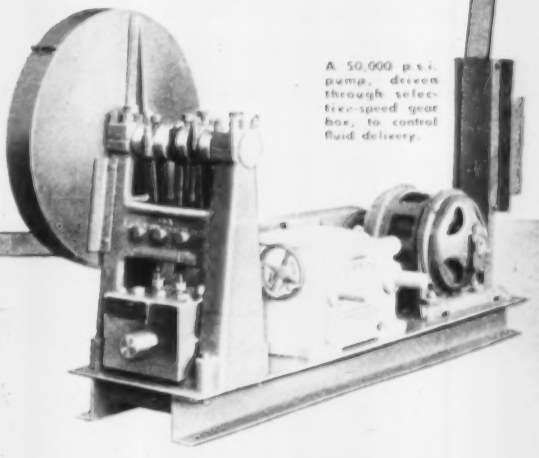

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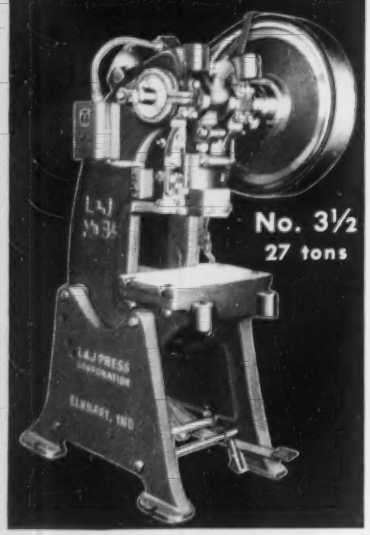

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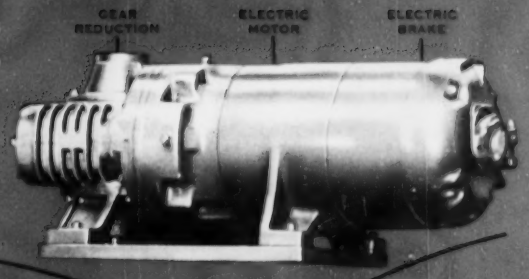
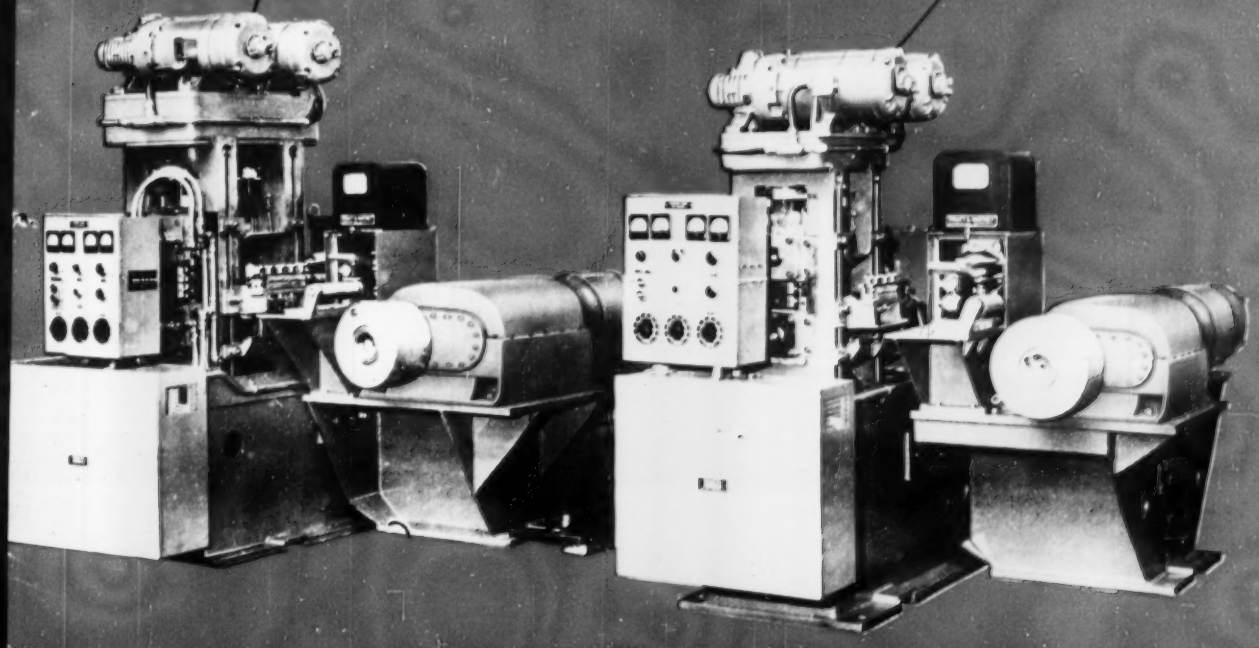


See how easily the standard electric motor, standard gear reduction, standard electric brake combine into a drive that gives the RIGHT horsepower, the RIGHT shaft speed, the RIGHT features . . . all in one compact unit. Nowhere else will you find power units that are so flexible, so easily adaptable, and in such a wide range of types and ratings.

Master power drives are available in thousands and thousands of ratings (⅛ to 400 HP) . . . in open, enclosed, splash proof, fan cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 430 to 1 ratio . . . with electric brakes . . . with fluid-drive . . . with mechanical or electronic variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best power drive for you.

standard units easily combine into special purpose drives

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO



How TIMKEN® bearings cut maintenance, simplify lubrication for Steel Company of Wales

THE rolls of this 45"x115" blooming and slabbing mill, in operation at the Steel Company of Wales, England, were mounted on Timken® tapered roller bearings by the builder, United Engineering and Foundry Company, to handle the heavy loads with minimum maintenance.

The lubrication system necessary is simple, and quick release couplings attached to the grease supply pipes enable roll change time to be reduced to a minimum. Also, there's less lubricant leakage during operation because Timken bearings hold roll necks and housings concentric, making closures more effective.

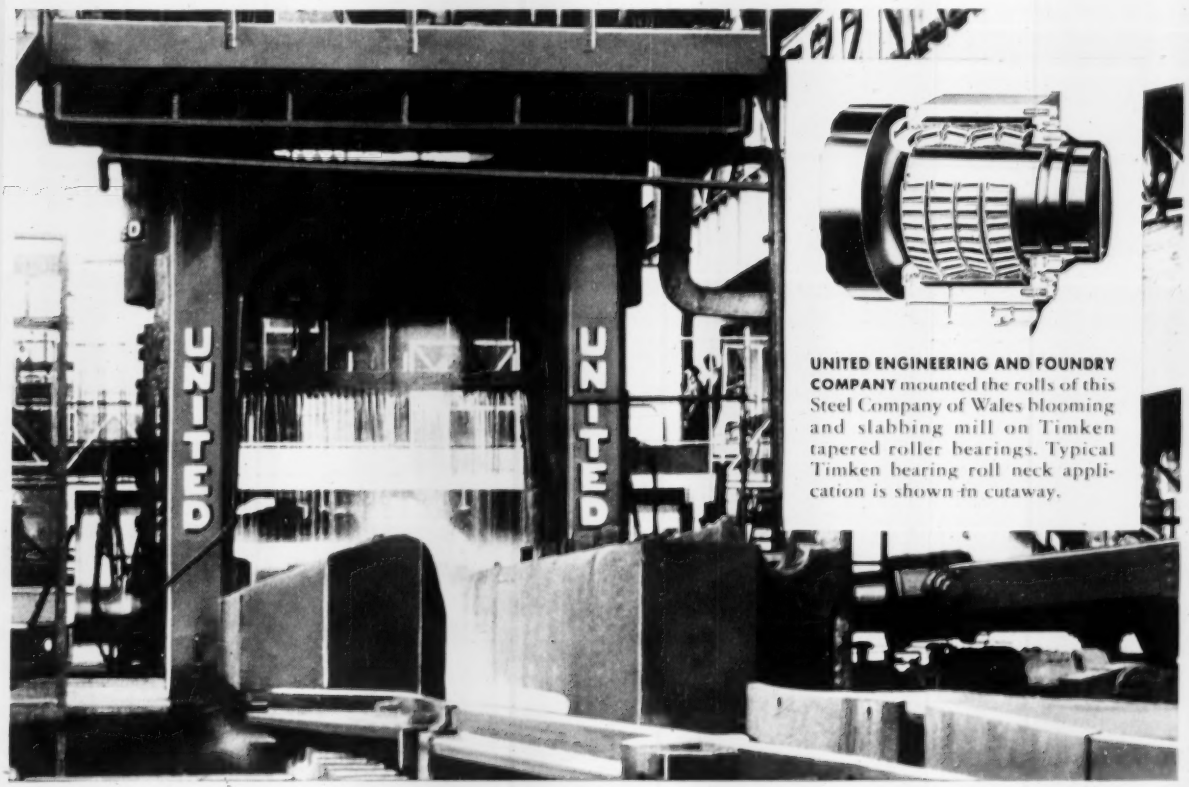
Since the tapered construction of Timken bearings enables them to take radial and thrust loads in any combination, maintenance is reduced. Special thrust bearings aren't needed. Chock mountings are simpler and more compact. Weight is minimized.

Savings in power consumption are considerable. The mill can accelerate faster because the true rolling motion and incredibly smooth surface finish of Timken bearings practically eliminate friction.

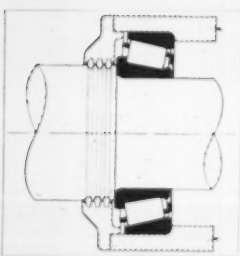
For help in designing your bearing application, consult our engineering department. We may be able to help you devise a better way to do the job. The Timken Roller Bearing Company, Canton 6, O. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



UNITED ENGINEERING AND FOUNDRY COMPANY mounted the rolls of this Steel Company of Wales blooming and slabbing mill on Timken tapered roller bearings. Typical Timken bearing roll neck application is shown in cutaway.

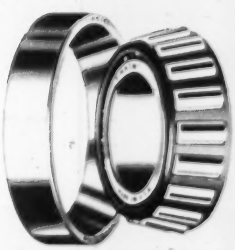


LUBRICANT STAYS IN —DIRT KEPT OUT

Because Timken bearings hold shafts concentric with housings, closures are made more effective. Lubricant is retained, dirt and moisture kept out.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis Timken steels.

TAPERED ROLLER BEARINGS



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION